

Scilab Textbook Companion for
Algebra
by P. Abbott And M. E. Wardle¹

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Book Description

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Scilab numbering policy used in this document and the relation to the above book.

Exa Example (Solved example)

Eqn Equation (Particular equation of the above book)

AP Appendix to Example(Scilab Code that is an Appednix to a particular Example of the above book)

For example, Exa 3.51 means solved example 3.51 of this book. Sec 2.3 means a scilab code whose theory is explained in Section 2.3 of the book.

Contents

List of Scilab Codes	4
1 The meaning of algebra	5
2 Elementary Operations	7
3 Brackets and Operations with Them	14
4 Positive and Negative numbers	18
5 Expressions and Equations	19
6 Linear Equations	29
7 Formulae	34
8 Simultaneous Equations	38
9 Linear Inequalities	43
10 Graphical representation of Quantities	52
11 The law of a straight line	55
12 Using inequalities to define regions	60

13	Multiplication of algebraic expressions	65
14	Factors	70
15	Fractions	80
16	Graphs of Quadratic Functions	86
17	Quadratic Equations	95
18	Indices	104
19	Logarithms	106
21	Variation	113
22	The determination of Laws	118
23	Rational and Irrational Numbers	121
24	Arithmetical and Geometrical Series	123

List of Scilab Codes

Exa 1.1	Conversion of pounds to pence	5
Exa 1.2	Distance car traveled	5
Exa 1.3	result in algebraic form	6
Exa 2.1	simplifying	7
Exa 2.2	Minimizing the terms	7
Exa 2.3	value of algebraic expression	8
Exa 2.4	Multiplication of powers of a number	8
Exa 2.5	Division of powers	9
Exa 2.6	Algebraic division	9
Exa 2.7	Sum of terms	9
Exa 2.8	Addition of algebraic terms	10
Exa 2.9	Subtraction of terms	10
Exa 2.10	simplification of algebraic expression	11
Exa 2.11	Algebraic subtraction	11
Exa 2.12	Division of terms	11
Exa 2.13	Algebraic Multiplication	12
Exa 2.14	Division of algebraic terms	12
Exa 3.1	Multiplication of expressions within brackets	14
Exa 3.2	Addition of expressions within brackets	14
Exa 3.3	Subtraction of expressions within brackets	15
Exa 3.4	Algebraic Difference	15
Exa 3.5	Substitution of values in algebraic expression	15
Exa 3.6	Systems of brackets	16
Exa 3.7	Multiple brackets	16
Exa 3.8	Simplifying brackets	16
Exa 4.1	Subtraction	18
Exa 5.1	Nth term of the sequence	19
Exa 5.2.a	Using function machines	19

Exa 5.2.b	Value substitution in function machine . . .	20
Exa 5.3.a	substitution in function machine	20
Exa 5.3.b	Square and add	21
Exa 5.4.a	Terms of the sequence	21
Exa 5.4.b	sequence	21
Exa 5.4.c	First 5 terms of the sequence	22
Exa 5.5.a	Sequence terms	22
Exa 5.5.b	First 5 terms	23
Exa 5.5.c	evaluate the expression	23
Exa 5.6.a	drawing function machine	24
Exa 5.6.b	simplifying by removing brackets	24
Exa 5.7.a	Composite rule fg	24
Exa 5.7.b	Composite rule gf	25
Exa 5.8	Inverse of the rule	25
Exa 5.9	Inverse	26
Exa 5.10	Substitute number in the rule	26
Exa 5.11	Finding x	26
Exa 5.12	Value of x	27
Exa 5.13	Finding n	27
Exa 6.1	Solving an equation	29
Exa 6.2	Finding 3 consecutive odd numbers	29
Exa 6.3	Solving the equation	30
Exa 6.4	Solve equation	31
Exa 6.5	Equating 2 expressions	31
Exa 6.6	equation solution	32
Exa 6.7	Number of men and women at dance party .	32
Exa 6.8	Finding the distance	33
Exa 6.9	Finding the weekly increase	33
Exa 7.1	Area of pyramid	34
Exa 7.2	Finding L	34
Exa 7.3	Finding f and d terms	35
Exa 7.4	Transform L	35
Exa 7.5	Finding velocity from equation	35
Exa 7.6	Finding n	36
Exa 7.7	Length of pendulum	36
Exa 7.8	Solving the equation	37
Exa 7.9	Solving x	37
Exa 8.1	Solving the equations	38

Exa 8.2	Finding x and y values from equation	38
Exa 8.3	Solving the equation	39
Exa 8.4	Finding R1 and R2	40
Exa 8.5	numbers of simultaneous equations	40
Exa 8.6	Values of m and b	41
Exa 8.7	total books sold and books sold at 25p	41
Exa 9.1.a	Inequality of n less than 3 on 0 to 10 number line	43
Exa 9.1.b	Inequality of n greater than or equal to 6 on 0 to 10 number line	43
Exa 9.1.c	Inequality of n between 2 and 5 on 0 to 10 number line	44
Exa 9.2.a	Number line representing inequality of n greater than 7	44
Exa 9.2.b	Number line representing n less than or equal to 3	45
Exa 9.2.c	Representing inequality on number line	45
Exa 9.3	Solving the inequality	46
Exa 9.4	Solving the greater than inequality	46
Exa 9.5	Solving the greater than or equal to inequality	47
Exa 9.6	Solving the less than inequality	47
Exa 9.7	Satisfying both the inequalities	48
Exa 9.8	Finding positive values in inequalities	49
Exa 9.9	Value of x satisfying the given inequalities	49
Exa 9.10	Values satisfying the inequalities	50
Exa 10.1	Annual premiums charged at various ages	52
Exa 10.2	Resistance for given length of wires	53
Exa 10.3	to show the relation between time and distance	53
Exa 11.1	Connection between net profit and number of customers	55
Exa 11.2	The law represented by a straight line graph	56
Exa 11.3	Graph of the given equation	57
Exa 11.4	Graph of the equation	57
Exa 11.5	Graphs of straight lines not passing through origins	58
Exa 11.6	Graphical solution of simultaneous equations	59
Exa 12.1	Graph the region described by inequalities	60

Exa 12.2	Finding one point in the region described by inequalities	61
Exa 12.3	Greatest and least values in the region . . .	61
Exa 12.4	Finding maximum profit with linear programming	62
Exa 12.5	Minimum cost of feed	63
Exa 13.1	Product of binomial expressions	65
Exa 13.2	Multiplication of algebraic expressions . . .	65
Exa 13.3	Multiplication of algebraic expressions . . .	66
Exa 13.4	Multiplication of algebraic expressions . . .	66
Exa 13.5	Product of algebraic expressions	67
Exa 13.6	Multiplication of a trinomial	67
Exa 13.7	Product of a trinomial	67
Exa 13.8	Square of a binomial expression	68
Exa 13.9	Square of a trinomial	68
Exa 13.10	Cube of a binomial	69
Exa 13.11	Product of sum and difference	69
Exa 14.1	factors of given expression	70
Exa 14.2	Factorize given expression	70
Exa 14.3	Finding factors	71
Exa 14.4	Factorize if possible	71
Exa 14.5	Factors of expression	71
Exa 14.6	Factorize the given expression	72
Exa 14.7	Factorize the given expression in terms of x	72
Exa 14.8	Factorize the given expression in terms of y	72
Exa 14.9	Factorize the expression	73
Exa 14.10	Factorize	73
Exa 14.11	Factorize	73
Exa 14.12	Factors of expression	74
Exa 14.13	Factorize of expression	74
Exa 14.14	Factorize the given expression	75
Exa 14.15	Representing square of binomial expression .	75
Exa 14.16	Checking complete square or not	76
Exa 14.17	Checking complete square or not	76
Exa 14.18	Factorize	77
Exa 14.19	Factorize the expression	77
Exa 14.20	Factorize the given expression	77
Exa 14.21	Factorize the expression	78

Exa 14.22	Difference of two squares	78
Exa 14.23	Area of ring between two concentric circles .	78
Exa 15.1	Algebraic fraction	80
Exa 15.2	Simplifying the factors	80
Exa 15.3	Reduction of fractions	81
Exa 15.4	Division of fractions	81
Exa 15.5	Multiplication of fractions	81
Exa 15.6	Subtraction of fractions	82
Exa 15.7	Fraction Subtraction	82
Exa 15.8	Subtraction of fractions	83
Exa 15.9	Division of fractions	83
Exa 15.10	Conversion of R in terms of R1 and R2 . . .	84
Exa 15.11	solving simple equations involving algebraic fractions	84
Exa 15.12	Solving algebraic fraction for n	85
Exa 16.1	Circumference of circle	86
Exa 16.2	Graph of given straight line	86
Exa 16.3	Straight line equation	87
Exa 16.4	Graph of a function of second degree	88
Exa 16.5	Graph of parabola	88
Exa 16.6	Curves of different parabolas	89
Exa 16.7	Curves of given expression	90
Exa 16.8	Change of axis	90
Exa 16.9	Graph of curves	91
Exa 16.10	graph of given expression	91
Exa 16.11	Graph of Y	92
Exa 16.12	Graph of parabola	92
Exa 16.13	Using graphs to solve quadratic inequalities	93
Exa 16.14	Using quadratic inequalities to describe re- gions	94
Exa 17.1	Solving quadratic equation	95
Exa 17.2	Solving quadratic equation	95
Exa 17.3	Solving equation	96
Exa 17.4	Solution of quadratic equation	96
Exa 17.5	quadratic equation Solution	97
Exa 17.6	quadratic equation Solution	97
Exa 17.7	Solving the equation	98

Exa 17.8	Time taken when body is projected vertically upwards	98
Exa 17.9	Speed and time for journey	99
Exa 17.10	Solving first degree equations	100
Exa 17.11	Solving symmetric equations	100
Exa 17.12	Solving the equations	101
Exa 17.13	Solving quadratic inequalities	101
Exa 17.14	Solving the inequality	102
Exa 18.1	Graph of exponential function	104
Exa 18.2	Operations with standard forms	104
Exa 19.1	Finding values from the graph	106
Exa 19.2	Notation for logarithms	107
Exa 19.3	Antilogarithm	107
Exa 19.4	Logarithm of x	107
Exa 19.5	Finding the logarithm	108
Exa 19.6	Finding the Nth root	108
Exa 19.7	Finding the logarithms of given numbers	109
Exa 19.8	Finding the number whose log value is given	109
Exa 19.9	Sum of logarithms	110
Exa 19.10	Difference of logarithms	110
Exa 19.11	Multiplication of logarithm	110
Exa 19.12	Multiplication of logarithm	111
Exa 19.13	Division of logarithm	111
Exa 19.14	Finding the logarithm	112
Exa 21.1	Graph of spring extension for different weights	113
Exa 21.2	Comparison of voltmeters	114
Exa 21.3	Inverse variation	114
Exa 21.4	Time of vibration of simple pendulum	115
Exa 21.5	Triangle area	115
Exa 21.6	Volume varies inversely with peressure	116
Exa 21.7	Relation between R and l	116
Exa 21.8	Joint variation	117
Exa 21.9	F varies directly with strength and inversely with distance	117
Exa 22.1	Plotting against power of a number	118
Exa 22.2	Law connecting the logarithms	119
Exa 23.1	Operation with surds	121
Exa 23.2	Rationalise	121

Exa 23.3	Simplify surds	122
Exa 24.1	Arithmetic series	123
Exa 24.2	Nth term in arithmetic series	123
Exa 24.3	Arithmetic mean	124
Exa 24.4	Finding common difference in AP	124
Exa 24.5	Finding n value in arithmetic sum	125
Exa 24.6	Geometric series	125
Exa 24.7	Seventh term of given series	126
Exa 24.8	Eighth term of given series	126
Exa 24.9	Finding the 5th term	127
Exa 24.10	Finding the common ratio	127
Exa 24.11	Sum of seven terms of the series	127
Exa 24.12	Sum of 7 terms	128
Exa 24.13	Sum of infinite terms	128
Exa 24.14	Sum to infinity of the series	129

Chapter 1

The meaning of algebra

Scilab code Exa 1.1 Conversion of pounds to pence

```
1
2 //ex1: no.of pence in x pounds added to y pence
3 clear;
4 clc;
5 close;
6 // ' to express pounds in pence, multiply by 100'
7 x=poly(0, 'x');
8 x_pounds=100*x; // x_pounds=100*x pence
9 mprintf(' total no. of pence =100x+y ')
```

Scilab code Exa 1.2 Distance car traveled

```
1
2 //ex2: car travels t h at v km/h.how far it go in 20
  min
3 clear;
4 clc;
5 close;
```

```
6 // 'car goes 1*v km in 1h 2*v km in 2h ... t*v km
   in th'
7 x=20/60;
8 mprintf('\ncar travels %f*vkm in 20min',x)
```

Scilab code Exa 1.3 result in algebraic form

```
1
2 //ex3
3 clear;
4 clc;
5 close;
6 x=poly(0, 'x');
7 y=poly(0, 'y');
8 sum1=3*x+5;
9 divisor=4*y;
10 mprintf("result in algebraic form: \n(3*x+5)/(4*y)")
```

Chapter 2

Elementary Operations

Scilab code Exa 2.1 simplifying

```
1
2 //simplify 5a+6b+2a-3b
3 clear;
4 clc;
5 close;
6 //('collecting like terms \n');
7 x=5+2;y=6-3;
8 printf("total=%ia+%ib",x,y);
```

Scilab code Exa 2.2 Minimizing the terms

```
1
2 clear;
3 clc;
4 close;
5 //'collecting like terms ;
6 x=15+7;y=6-3;
7 printf("total=%ix+%iy-5",x,y)
```

Scilab code Exa 2.3 value of algebraic expression

```
1
2 //find value of 6x+2y-3x+4y-3 when x=3 & y=2
3 clear;
4 clc;
5 close;
6 x_coeff=6-3;y_coeff=2+4;
7 //”substitutue given values”
8 x=3;y=2;
9 val=x_coeff*x + y_coeff*y -3
```

Scilab code Exa 2.4 Multiplication of powers of a number

```
1
2 clc;
3 clear;
4 close;
5 x=poly(0, 'x');
6 p1=x^4;
7 p2=p1;
8 ex1_ans=p1*p2
9 a=poly(0, 'a');
10 p1=2*a^7;
11 p2=a^3;
12 ex2_ans=p1*p2
13 b=poly(0, 'b');
14 p1=5*b^2;
15 p2=3*b^5;
16 ex3_ans=p1*p2
17 //a^2*ab^2
18 ex4_ans=string('a^3b^3')
```

Scilab code Exa 2.5 Division of powers

```
1
2 //84a^6/12a^2
3 clear;
4 clc;
5 close;
6 a=poly(0, 'a');
7 p1=84*a^6;
8 p2=12*a^2;
9 p=p1/p2;
10 horner(p, a)
```

Scilab code Exa 2.6 Algebraic division

```
1
2 //3x^4/6x^6
3 clear;
4 clc;
5 close;
6 x=poly(0, 'x');
7 p1=3*x^4;
8 p2=6*x^6;
9 p=p1/p2
```

Scilab code Exa 2.7 Sum of terms

```
1
2 //x/3 + x/5
```

```
3 clear;
4 clc;
5 close;
6 x=poly(0, 'x');
7 p1=x/3;
8 p2=x/5;
9 p=p1+p2;
10 q=8*x/15;
11 if(p==q)
12     mprintf(" val=8*x/15 \n")
13 end
```

Scilab code Exa 2.8 Addition of algebraic terms

```
1
2 //sum of 3/a + 4/b
3 clear;
4 clc;
5 close;
6 val=string("(3b + 4a)/(ab)")
```

Scilab code Exa 2.9 Subtraction of terms

```
1
2 //x/y - a/b
3 clear;
4 clc;
5 close;
6 val=string('(bx-ay)/(by)')
```

Scilab code Exa 2.10 simplification of algebraic expression

```
1
2 //2a/15 + 5b/12
3 clear;
4 clc;
5 close;
6 d=int32([15,12]); //"L.C.M of denominators"
7 k=lcm(d);
8 a_coeff=60/15*2;
9 b_coeff=60/12*5;
10 disp('ans=')
11 mprintf("( %ia+%ib)/%i", a_coeff, b_coeff, k)
```

Scilab code Exa 2.11 Algebraic subtraction

```
1
2 //x/12a^2b - y/18ab^2
3 clear;
4 clc;
5 close;
6 d=int32([18,12]); //L.C.M of denominators
7 k=lcm(d);
8 //"L.C.M of a^2*b and a*b^2 is a^2*b^2"
9 x_coeff=36/12;
10 y_coeff=36/18;
11 disp('ans=')
12 mprintf("( %ibx-%iay)/%ia^2b^2", x_coeff, y_coeff, k)
```

Scilab code Exa 2.12 Division of terms

```
1
2 //4*x^3*y/(6*x*y^3)
```

```

3 clear;
4 clc;
5 close;
6 d=int32([4,6]);
7 m=4/gcd(d);
8 n=6/gcd(d);
9 x=poly(0,'x');y=poly(0,'y');
10 p1=x^3;p2=x;p=p1/p2;
11 q1=y;q2=y^3;q=q1/q2;
12 // val=m/n*p*q
13 disp('val=')
14 mprintf("%i/%i*x^2/y^2",m,n)

```

Scilab code Exa 2.13 Algebraic Multiplication

```

1
2 //6*a*x^4*2*y^3/(14*x^2*y^2*3*a^4)
3 clear;
4 clc;
5 close;
6 x=poly(0,'x');y=poly(0,'y');a=poly(0,'a');
7 num=6*2/(14*3);
8 p1=x^4;p2=x^2;p=p1/p2;
9 q1=y^3;q2=y^2;q=q1/q2;
10 r1=a;r2=a^4;r=r1/r2;
11 // val=num*p*q*r
12 disp('val=')
13 mprintf("%f*x^2*y/a^3",num)

```

Scilab code Exa 2.14 Division of algebraic terms

```

1
2 //(8x^3)/(5a^2y) *(3a)/(4x^2)

```

```
3 clear;
4 clc;
5 close;
6 x=poly(0, 'x'); y=poly(0, 'y'); a=poly(0, 'a');
7 p1=x^3; p2=x^2; p=p1/p2;
8 q=1/y;
9 r1=a; r2=a^2; r=r1/r2;
10 num=8*3/(5*4);
11 // val=num*p*q*r
12 disp('val=')
13 mprintf("%f*x/(a*y)", num)
```

Chapter 3

Brackets and Operations with Them

Scilab code Exa 3.1 Multiplication of expressions within brackets

```
1
2
3 //simplify a(a^2+ab+b^2)
4 clear;
5 clc;
6 close;
7 val=string('a^3+(a^2)b+a(b^2)')
```

Scilab code Exa 3.2 Addition of expressions within brackets

```
1
2
3
4 //simplify 2(4a+3b)+6(2a-b)
5 clear;
6 clc;
```

```
7 close;
8 //b gets cancelled
9 val=string('20a')
```

Scilab code Exa 3.3 Subtraction of expressions within brackets

```
1
2 //simplify 5x-(5y+2x)
3 clear;
4 clc;
5 close;
6 //on adding like terms
7 val=string('3x-5y')
```

Scilab code Exa 3.4 Algebraic Difference

```
1
2 //simplify 3(4a-b)-2(3a-2b)
3 clear;
4 clc;
5 close;
6 //by removing braces
7 a_coeff=3*4-2*3;b_coeff=-3-2*-2;
8 mprintf("total=%ia+%ib\n",a_coeff,b_coeff);
```

Scilab code Exa 3.5 Substitution of values in algebraic expression

```
1
2 //x(2x-y)-x(x-y)-y(x+2y)
3 clear;
```

```

4  clc;
5  close;
6  disp("1) after simplifying")
7  val=string('x^2-x*y-2*y^2')
8  disp("2) after substituting given values")
9  x=2;y=1;
10 val=evstr(val)

```

Scilab code Exa 3.6 Systems of brackets

```

1
2 //simplify 2(3a+5(b+c))
3 clear;
4 clc;
5 close;
6 //by removing braces ,
7 val=string('6a+10b+10c')

```

Scilab code Exa 3.7 Multiple brackets

```

1
2 //simplify 3(3a-2(a-b))
3 clear;
4 clc;
5 close;
6 //by removing braces ,
7 a_coeff=3*3-3*2;b_coeff=3*2;
8 mprintf(" total=%ia+%ib\n",a_coeff,b_coeff);

```

Scilab code Exa 3.8 Simplifying brackets


```
1
2 //simplify 12a-2[3a-(4-2(a-3))]
3 clear;
4 clc;
5 close;
6 a=poly(0, 'a');
7 p=12*a-2*[3*a-{4-2*(a-3)}]
```

Chapter 4

Positive and Negative numbers

Scilab code Exa 4.1 Subtraction

```
1
2 clear;
3 clc;
4 close;
5 disp("subtraction")
6 x=poly(0, 'x');
7 b=poly(0, 'b');
8 val1=5*x-(-3*x)
9 val2=-2*b-(-4*b)
```

Chapter 5

Expressions and Equations

Scilab code Exa 5.1 Nth term of the sequence

```
1
2 clc;
3 clear;
4 close;
5 //46ex
6 //nth term in the sequence 2,4,6,8,10... is 2n. 5th
   term is?
7 term5=2*5
8 //nth term in the sequence 1,4,9,16,25 is n^2. 5th
   term is?
9 ex2_term5=5^2
```

Scilab code Exa 5.2.a Using function machines

```
1
2 // 5,8,11,14,17.....
3 clear;
4 clc;
```

```
5 close;
6 a=5; //a is starting number of the series
7 n=5; //given n=5
8 d=3; //difference between the numbers
9 td=a+(n-1)*d; //formula to be used for arithmetic
   series
10 mprintf("ans= %i",td)
```

Scilab code Exa 5.2.b Value substitution in function machine

```
1
2 // 9,12,15,18,21.....
3 clear;
4 clc;
5 close;
6 a=9; //a is starting number of the series
7 n=5; //given n=5
8 d=3; //difference between the numbers
9 td=a+(n-1)*d; //formula to be used for arithmetic
   series
10 mprintf("ans= %i",td)
```

Scilab code Exa 5.3.a substitution in function machine

```
1
2 // 5,12,19,26,33.....
3 clear;
4 clc;
5 close;
6 a=5; //a is starting number of the series
7 n=5; //given n=5
8 d=7; //difference between the numbers
```

```
9 td=a+(n-1)*d; //formula to be used for arithmetic
   series
10 mprintf("result= %i",td)
```

Scilab code Exa 5.3.b Square and add

```
1
2 // 3,6,11,18,27.....
3 clear;
4 clc;
5 close;
6 n=5;
7 td=n^2+2;
8 mprintf("result= %i",td)
```

Scilab code Exa 5.4.a Terms of the sequence

```
1
2 // 5n-2
3 clear;
4 clc;
5 close;
6 mprintf("the first five terms of the sequence are: \
   n");
7 for n=1:5
8     disp(5*n-2)
9 end
```

Scilab code Exa 5.4.b sequence

```

1
2 //draw function machine for 4(n+5)
3 clear;
4 clc;
5 close;
6 mprintf("the first five terms of the sequence are: \
      n");
7 for n=1:5
8     disp(4*(n+5))
9     end

```

Scilab code Exa 5.4.c First 5 terms of the sequence

```

1
2 //draw function machine for n^2+5
3 clear;
4 clc;
5 close;
6 mprintf("the first five terms of the sequence are: \
      n");
7 for n=1:5
8     disp(n^2+5)
9     end

```

Scilab code Exa 5.5.a Sequence terms

```

1
2 // 4(5n-2)
3 clear;
4 clc;
5 close;
6 mprintf("the first five terms of the sequence are: \
      n");

```

```
7 for n=1:5
8     disp(4*(5*n-2))
9 end
```

Scilab code Exa 5.5.b First 5 terms

```
1
2 // 4(n+5)+3
3 clear;
4 clc;
5 close;
6 mprintf("the first five terms of the sequence are: \
n");
7 for n=1:5
8     disp(4*(n+5)+3)
9 end
```

Scilab code Exa 5.5.c evaluate the expression

```
1
2 // 2(n^2+5)
3 clear;
4 clc;
5 close;
6 mprintf("the first five terms of the sequence are: \
n");
7 for n=1:5
8     disp(2*(n^2+5))
9 end
```

Scilab code Exa 5.6.a drawing function machine

```
1
2 //evaluate 2*(3*n^2+5)-4
3 clear;
4 clc;
5 close;
6 n=7; //given
7 disp('ans=')
8 disp(2*(3*n^2+5)-4)
```

Scilab code Exa 5.6.b simplifying by removing brackets

```
1
2 //evaluate 2*(3*n^2+5)-4 by removing brackets
3 clear;
4 clc;
5 close;
6 n=poly(0, 'n');
7 p1=2*(3*n^2+5)-4; //removing braces
8 n=7; //given
9 val=2*(3*n^2+5)-4
```

Scilab code Exa 5.7.a Composite rule fg

```
1
2 //f(x):x->3x;g(x):x->x-2;fg(5)
3 clear;
4 clc;
5 close;
6 x=poly(0, 'x');
7 f=3*x;
8 g=x-2;
```



```
9 // fg= f(g(x))=f(x-2)=3*(x-2)
10 x=5;
11 fg=3*(x-2)
```

Scilab code Exa 5.7.b Composite rule gf

```
1
2 //f(x):x->x+3;g(x):x->x^2;gf(5)
3 clear;
4 clc;
5 close;
6 x=poly(0,'x');
7 f=x+3;
8 g=x^2;
9 // gf= g(f(x))=g(x+3)=(x+3)^2
10 x=5;
11 gf=(x+3)^2
```

Scilab code Exa 5.8 Inverse of the rule

```
1
2 //inverse of x->3x+4
3 clear;
4 clc;
5 close;
6 x=poly(0,'x');
7 p1=3*x+4;
8 disp(p1,"x->")
9 mprintf("inverse of the rule is:\n (x-4)/3")
```

Scilab code Exa 5.9 Inverse

```
1
2 //inverse of  $x \rightarrow 3(x+4)-2$ 
3 clear;
4 clc;
5 close;
6 x=poly(0, 'x');
7 mprintf("1)inverse of the rule is:\n (x+2)/3-4 \n ")
8 ;
9 x=6; //given
10 x=3*(x+4)-2;
11 mprintf("2)");
12 inv_val=(x+2)/3-4
```

Scilab code Exa 5.10 Substitute number in the rule

```
1
2 clear;
3 clc;
4 close;
5 for x=1:20
6     if (3*x+4==19)
7         mprintf("the number which gives 19 as result is
8             %i",x)
9     end
10 end
```

Scilab code Exa 5.11 Finding x

```
1
2 clear;
3 clc;
```

```
4 close;
5 for x=1:10
6     if (5*x-7==8)
7         mprintf("the value of x is %i\n",x)
8         break
9     end
10 end
```

Scilab code Exa 5.12 Value of x

```
1
2 clear;
3 clc;
4 close;
5 for x=1:20
6     if (5*(x-3)==20)
7         mprintf("the value of x is %i \n",x)
8         break
9     end
10 end
```

Scilab code Exa 5.13 Finding n

```
1
2 clear;
3 clc;
4 close;
5 for n=1:60
6     if (3*(2*n-5)+4==55)
7         mprintf("the value of n is %i \n",n)
8         break
9     end
10 end
```


Chapter 6

Linear Equations

Scilab code Exa 6.1 Solving an equation

```
1
2 //8 times a number is decreased by 5 the result is
   123
3 clear;
4 clc;
5 close;
6 x=poly(0, 'x');
7 //let x be the number
8 expr=8*x-5;
9 for x=1:100
10     if((8*x-5)==123)
11         mprintf("the number is %i",x)
12     end
13 end
```

Scilab code Exa 6.2 Finding 3 consecutive odd numbers

```
1
```

```

2 //sum of 3 consecutive odd no.'s is 81
3 clear;
4 clc;
5 close;
6 //let the 3 consecutive odd numbers be 2n+1,2n+3,2n
  +5
7 n=poly(0, 'n');
8 expr=(2*n+1)+(2*n+3)+(2*n+5);
9 for n=1:100
10     if ((2*n+1)+(2*n+3)+(2*n+5)==81)
11         //mprintf(" n=%i \n",n);
12         break
13     end
14 end
15 n1=2*n+1;
16 n2=2*n+3;
17 n3=2*n+5;
18 mprintf("\n the numbers are %i ,%i, %i\n",n1,n2,n3)

```

Scilab code Exa 6.3 Solving the equation

```

1
2 clear;
3 clc;
4 close;
5 x=poly(0, 'x');
6 p1=(6*x-5);
7 p2=(2*x+9);
8 p3=p1-p2;
9 x=roots(p3)
10 left=6*x-5; //check by substitution
11 right=2*x+9;
12 if(left==right)
13     mprintf(" satisfies the equation \n")
14 end

```

Scilab code Exa 6.4 Solve equation

```
1
2 clear;
3 clc;
4 close;
5 x=poly(0, 'x');
6 p1=10*(x-4);
7 p2=4*(2*x-1)+5;
8 p3=p1-p2;
9 x=roots(p3);
10 left=10*(x-4); //substitution
11 right=4*(2*x-1)+5;
12 if(left==right)
13     format(5)
14 x
15 end
```

Scilab code Exa 6.5 Equating 2 expressions

```
1
2 clear;
3 clc;
4 close;
5 x=poly(0, 'x');
6 p1=3*x/5+x/2;
7 p2=5*x/4-3;
8 p3=p1-p2;
9 x=roots(p3) //by the law of signs
```

Scilab code Exa 6.6 equation solution

```
1
2 clear;
3 clc;
4 close;
5 x=poly(0, 'x');
6 p1=4*x-(x-2)/3;
7 p2=5+(2*x+1)/4;
8 p3=p1-p2;
9 x=roots(p3)
10 left=4*x-(x-2)/3; // substitution
11 right=5+(2*x+1)/4;
12 if(left==right)
13 mprintf("satisfies the equation \n")
14 end
```

Scilab code Exa 6.7 Number of men and women at dance party

```
1 clear;
2 clc;
3 close;
4 x=poly(0, 'x');
5 //let x be the number of men.then, x+10 is no. of
  women as per given data
6 money_paid_by_men=20*x;
7 money_paid_by_women=15*x + 10;
8 total=1620
9 expr=8*x-5;
10 for x=1:100
11     if((20*x + 15*(x + 10))==1620)
12         mprintf("the number of men is %i \n",x)
13         mprintf("the number of women is %i",x+10)
14     end
15 end
```

Scilab code Exa 6.8 Finding the distance

```
1 clear;
2 clc;
3 close;
4 x=poly(0, 'x');
5 //let x be distance in kilometers
6 time_1st_journey=x/64
7 time_2nd_journey=x/80
8 total_time=9;
9 for x=1:500
10     if((x/64 + x/80) == 9)
11         mprintf("the value of x is %iKm \n",x)
12     end
13 end
```

Scilab code Exa 6.9 Finding the weekly increase

```
1 clear;
2 clc;
3 close;
4 x=poly(0, 'x');
5 //let x be amount of increase in pence
6 mans_new_wage=480+x;
7 womens_new_wage=370+x;
8 for x=1:500
9     if((480+x) == (6*(370+x)/5))//by given data
10         mprintf("the weekly increase is %ip \n",x)
11     end
12 end
```

Chapter 7

Formulae

Scilab code Exa 7.1 Area of pyramid

```
1
2 //total area(A) of the surface of a square pyramid
3 clear;
4 clc;
5 close;
6 //AB=a , OQ=d
7 //OQ is perpendicular to AB.Represents height of
   triangle AOB
8 tot_area=string('base_area + triangles_area')
9 //base_area=a^2.triangles_area=4*(a*d)/2
10 A=string('a(a+2d)')
```

Scilab code Exa 7.2 Finding L

```
1
2 //L=W(T-t)/w - t
3 clear;
4 clc;
```

```

5 close;
6 W=380;T=28.5;t=8.5;w=115; //given
7 L=string(' (W*(T-t)/w)-t ');
8 disp("substituting given values")
9 L=evstr(L)

```

Scilab code Exa 7.3 Finding f and d terms

```

1
2 //T=%pi*f*d^3/16
3 clear;
4 clc;
5 close;
6 disp(" (1) f in terms of other quantities is")
7 f=string(' 16*T/(%pi*d^3) ')
8 disp(" (2) d in terms of other quantities is ")
9 d=string(' (16*T/(%pi*f))^(1/3) ')

```

Scilab code Exa 7.4 Transform L

```

1
2 //transform L=1+(8*d^2)/(3*l)
3 clear;
4 clc;
5 close;
6 disp(" d in terms of other quantities is")
7 //3*l*L=3*l^2+8*d^2
8 d=string(' sqrt((3*l*L-3*l^2)/8) ')

```

Scilab code Exa 7.5 Finding velocity from equation

```

1
2 //the velocity ,V, of water flowing through a pipe ,
   occurs in the formula , $h=0.03*L*V^2/(D*2*g)$ 
3 clear;
4 clc;
5 close;
6 disp("changing the subject of formula to V")
7 //V^2/(2*g)=H*d/(0.03*L)
8 V=string('sqrt(2*g*h*D/(0.03*L))')
```

Scilab code Exa 7.6 Finding n

```

1
2 //a-b=x*(c-n*d)
3 clear;
4 clc;
5 close;
6 disp('n in terms of other quantities is')
7 //n*d=c-(a-b)/x
8 n=string('{c-(a-b)/x}/d')
```

Scilab code Exa 7.7 Length of pendulum

```

1
2 //time of vibration of a simple pendulum is given by
   the formula , $t=2*\%pi*\text{sqrt}(l/g)$ 
3 clear;
4 clc;
5 close;
6 disp('l in terms of other quantities is')
7 //t^2*g=4*\%pi^2*l
8 l=string('g*t^2/4*\%pi^2')
```

Scilab code Exa 7.8 Solving the equation

```
1
2 //solve 5*x-a=2*x-b
3 clear;
4 clc;
5 close;
6 //collecting like terms to one side
7 x=poly(0, 'x');
8 p=5*x-2*x; //Also, p=a-b
9 x=string('(a-b)/3')
```

Scilab code Exa 7.9 Solving x

```
1
2 //solve for x, a*(x-2)=5*x-(a+b)
3 clear;
4 clc;
5 close;
6 //removing brackets. "a*x-5*x=a-b"
7 x=string('(a-b)/(a-5)')
```

Chapter 8

Simultaneous Equations

Scilab code Exa 8.1 Solving the equations

```
1
2 //2x+y=21, 3x+4y=44
3 clear;
4 clc;
5 close;
6 x=poly(0, 'x');
7 y=21-2*x; //equation 1
8 y=(44-3*x)/4; //equation 2
9 for x=1:20
10     if (21-2*x==(44-3*x)/4)
11         mprintf(" the solution is :\n x=%i \n ",x)
12         break
13     end
14 end
15 //” substitute the x value in any one of the above
    equations”
16 y=21-2*x;mprintf(" y=%i \n",y)
```

Scilab code Exa 8.2 Finding x and y values from equation

```

1
2 //x+y=15,3x-y=21
3 clear;
4 clc;
5 close;
6 x=poly(0, 'x ');
7 y=15-x; //equation 1
8 Y=3*x-21; //equation 2
9 disp("the solution is ");
10 p2=y-Y;
11 x=roots(p2)
12 //substitute x value in equation 1
13 y=15-x

```

Scilab code Exa 8.3 Solving the equation

```

1
2 //2x+3y=42, 5x-y=20
3 clear;
4 clc;
5 close;
6 x=poly(0, 'x ');
7 y=(42-2*x)/3; //equation 1
8 y=5*x-20; //equation 2
9 for x=1:20
10     if ((42-2*x)/3==5*x-20)
11         mprintf("x=%i ",x)
12         break
13     end
14 end
15 //substitute the x value in any one of the above
    equations
16 y=5*x-20;mprintf("y=%i",y)
17 printf("\n the solution is : \n");
18 [x y]

```

Scilab code Exa 8.4 Finding R1 and R2

```
1
2 // 0.5R1+1.2R2=1.486,4.5R1-2R2=4.67
3 clear;
4 clc;
5 close;
6 R2=poly(0, 'R2');
7 R1=(1.486-1.2*R2)/0.5;
8 R=(4.67+2*R2)/4.5;
9 P=R1-R;
10 printf("THE SOLUTION IS: \n");
11 R2=roots(P)
12 //SUBSTITUTE IN THE EQUATION
13 R1=(1.486-1.2*R2)/0.5
```

Scilab code Exa 8.5 numbers of simultaneous equations

```
1
2 //ex1
3 clear;
4 clc;
5 close;
6 x=poly(0, 'x');
7 //sum of first no.(i.e., x) and 3 times the second
  no.(i.e., y) is 53 =>x+3*y=53
8 y=(53-x)/3;
9 //difference between 4 times the first and twice the
  2nd is 2 => 4x-2y=2
10 y=(4*x-2)/2;
11 printf("the solution is : \n");
```



```

12 for x=1:100
13     if ((53-x)/3==(4*x-2)/2)
14         mprintf("x=%i", x)
15         break
16     end
17 end
18 // "substitute the x value in any one of the above
    equations"
19 y=(53-x)/3; mprintf("y=%i", y)

```

Scilab code Exa 8.6 Values of m and b

```

1
2 //y=mx+b
3 //given x=4,y=6 and x=2.4,y=4.5
4 clear;
5 clc;
6 close;
7 m=poly(0, 'm');
8 b=6-4*m; //(equation 1) when x=4,y=6
9 B=4.5-2.4*m; //(equation 2) when x=2.4,y=4.5
10 P=b-B;
11 disp("the solution is :");
12 m=roots(P)
13 //substitute this value
14 b=6-4*m
15 // "substitute these values in the equation y=mx+b"
16 x=poly(0, 'x');
17 y=m*x+b

```

Scilab code Exa 8.7 total books sold and books sold at 25p

1

```

2 //ex3
3 clear;
4 clc;
5 close;
6 //let x=number originally sold at 25p
7 //let y=number originally sold at 20p
8 //amounts received for these were 25x pence and 20y
   pence & their total value was 1100pence =>25x+20y
   =1100
9 x=poly(0, 'x');
10 y=(1100-25*x)/20;
11 //when the no.s are reversed he receives 20x and 25
   ypence ans their total value is 1150 pence =>20x
   +25y=1150
12 y=(1150-20*x)/25;
13 for x=1:100
14     if((1100-25*x)/20==(1150-20*x)/25)
15         break
16     end
17 end
18 //”substitute the x value in any one of the above
   equations”
19 y=(1100-25*x)/20;
20 mprintf(”the total no. of books sold was %i \n ”,x+y
   )
21 mprintf(”the number originally sold at 25p was %i”,x
   );

```

Chapter 9

Linear Inequalities

Scilab code Exa 9.1.a Inequality of n less than 3 on 0 to 10 number line

```
1
2 //n<3
3 clear;
4 clc;
5 close;
6 x=string(0:10);
7     n=string(' '<'+strcat(x,'—')+'>'); //0 to 10 no
8     . line
9     strsubst(n,'0---1---2---','-----')
10
11     disp('the SOLID LINE specifies region n<3')
```

Scilab code Exa 9.1.b Inequality of n greater than or equal to 6 on 0 to 10 number

```
1
2 //n>=6
3 clear;
```

```

4  clc;
5  close;
6  x=string(0:10);
7      n=string('<'+strcat(x,'---')+ '>'); //0 to 10
          no. line
8
9      n1=strsubst(n, '6---7---8---9---10', '
          ----- ');
10
11     mprintf("\n the number line \n \n %s represents
          n>=6 ",n1)

```

Scilab code Exa 9.1.c Inequality of n between 2 and 5 on 0 to 10 number line

```

1
2 //2<n<=5
3 clear;
4 clc;
5 close;
6 x=string(0:10);
7      n=string('<'+strcat(x,'---')+ '>'); //0 to 10 no
          . line
8
9      n1=strsubst(n, '---3---4---5', ' ----- '
          );
10
11     mprintf("\n the number line \n \n %s
          represents 2<n<=5 ",n1)

```

Scilab code Exa 9.2.a Number line representing inequality of n greater than 7

```

1
2 //what inequality is represented on no. line

```

```

3 clear;
4 clc;
5 close;
6 x=string(0:10);
7     n=string('<'+strcat(x,'---')+ '>'); //0 to 10 no.
           line
8
9     n1=string(strsubst(n,'---8---9---10','
           -----'));
10
11 mprintf("\n the number line \n %s represents n>7 ",
           n1)

```

Scilab code Exa 9.2.b Number line representing n less than or equal to 3

```

1
2 //what inequality is represented on no. line
3 clear;
4 clc;
5 close;
6 x=string(0:10);
7     n=string('<'+strcat(x,'---')+ '>'); //0 to 10 no
           . line
8
9     n1=string(strsubst(n,'0---1---2---3','
           -----'));
10
11 mprintf("\n the number line \n %s represents n1<=3
           ",n1)

```

Scilab code Exa 9.2.c Representing inequality on number line

1

```

2 //what inequality is represented on no. line
3 clear;
4 clc;
5 close;
6 x=string(0:10);
7     n=string('<'+strcat(x,'---')+ '>'); //0 to 10 no
      . line
8
9     n1=string(strsubst(n,'5---6---7---','
      -----'));
10
11 mprintf("\n the number line \n \n %s represents
      5<=n1<8",n1)

```

Scilab code Exa 9.3 Solving the inequality

```

1
2 //3x-5<2x+8
3 clear;
4 clc;
5 close;
6 x=poly(0,'x');
7 p1=(3*x-5);
8 p2=(2*x+8);
9 //p1-p2<0
10 disp("<0",p1-p2)
11 mprintf("i.e., x<13 is the solution for those values
      of x which are < 13")

```

Scilab code Exa 9.4 Solving the greater than inequality

```

1
2 //3x+5>5x-9

```

```

3 clear;
4 clc;
5 close;
6 x=poly(0, 'x');
7 p1=(3*x+5);
8 p2=(5*x-9);
9 //p1-p2>0
10 disp(">0", (p1-p2)/2)
11 mprintf("i.e., x<7 is the solution for those values
of x which are < 7")

```

Scilab code Exa 9.5 Solving the greater than or equal to inequality

```

1
2 //2(3x+5)+1>=(4x-9)
3 clear;
4 clc;
5 close;
6 x=poly(0, 'x');
7 p1=2*(3*x+5)+1;
8 p2=(4*x-9);
9 //p1-p2>=0
10 disp(">=0", (p1-p2)/2)
11 mprintf("\n i.e., x>=-10 is the solution for those
values of x which are >= 10")

```

Scilab code Exa 9.6 Solving the less than inequality

```

1
2 //8/x<2
3 clear;
4 clc;
5 close;

```

```

6 // x is any no. greater than 4 and x can also be a
  negative no.
7 mprintf("8<2*x or x>4 is the solution if x is
  positive no.")
8
9 disp("if x were neagative ,then the inequality would
  become 8>2*x ")

```

Scilab code Exa 9.7 Satisfying both the inequalities

```

1
2 //find x which satisfies 3*x+2>8 & 5*x-3<27
3 clear;
4 clc;
5 close;
6 x=poly(0, 'x');
7 for x=1:100
8     if(3*x+2>8)
9         mprintf("x>%i\n\nand", x) //solving the first we
           get
10            break
11     end
12 end
13 x=1;
14 while(5*x-3<27) //on solving the second we get
15     x=x+1;
16     continue
17 end
18 mprintf("x<%i \n", x);
19 x=string(0:10);
20 n=string('<'+strcat(x, '—')+'>'); //0 to 10 no. line
21 n1=strsubst(n, '—4—5—', '-----');
22 mprintf('the solid line in the number line \n %s
  represents 3<x<6 ",n1)

```

Scilab code Exa 9.8 Finding positive values in inequalities

```
1
2 //find x which satisfies  $3*(x+5)>8*x$  &  $5*(x-3)<27-x$ 
3 clear;
4 clc;
5 close;
6 x=poly(0, 'x');
7 x=1;
8 while (3*(x+5)>8*x)
9     x=x+1;
10    continue
11 end
12 mprintf("\n x<%i\n\nand",x)
13 while (5*(x-3)+x<27) //on solving the second we get
14     x=x+1;
15    continue
16 end
17 mprintf("x<%i \n",x)
18 x=string(0:10);
19 n=string('<'+strcat(x,'---')+ '>'); // -2 to 8 no.
    line
20 n1=strsubst(n, '0---1---2---', '-----');
21 mprintf('the SOLID LINE specifies final region  $0 \leq x$ 
    <3 \n %s',n1)
```

Scilab code Exa 9.9 Value of x satisfying the given inequalities

```
1
2 //  $2 < x < 7$  &  $4 < x < 9$ 
3 clear;
4 clc;
```

```

5 close;
6 x=string(0:10);
7 n=string('<'+strcat(x,'---')+>'); //0 to 10 no.
  line
8 n1=strsubst(n,'---3---4---5---6---','',
  -----'); //2<x<7
9 n2=strsubst(n,'---5---6---7---8---','',
  -----'); //4<x<9
10 n3=strsubst(n,'---5---6---','', '-----');
11 mprintf('the inequality which satisfies both
  inequalities \n2<x<7 \t%s\n\n4<x<9\t%s\nis\n4<x<7\
  t%s',n1,n2,n3)

```

Scilab code Exa 9.10 Values satisfying the inequalities

```

1
2 // -2<x<=3 & -1<x<=5
3 clear;
4 clc;
5 close;
6 x=string(-2:6);
7 n=string('<'+strcat(x,'~~~')+>'); //0 to 10
  no. line
8
9 n1= strsubst(n,'~~~ -1~~~0~~~1~~~2~~~3',',',
  -----'); // -2<x<=3
10 n2= strsubst(n,'~~~0~~~1~~~2~~~3~~~4~~~5',',',
  -----'); // -1<x<=5
11
12
13 n3= strsubst(n,'~~~0~~~1~~~2~~~3',',',
  -----');
14
15
16 mprintf('the inequality which satisfies both

```

inequalities \n-2<x<=3 \t%s\n\n-1<x<=5\t\t%s\
nis \n-1<x<=3\t\t%s ', n1, n2, n3)

Chapter 10

Graphical representation of Quantities

Scilab code Exa 10.1 Annual premiums charged at various ages

```
1
2 clear;
3 clc;
4 close ;
5 clf;
6 AGE=[25 30 35 40 45 50];
7 premium_in_$=[2.33 2.59 2.91 3.31 3.81 4.53];
8 plot(AGE,premium_in_$,3);
9 xtitle("Annual Premiums charged by an insurance
        company","AGE(in years)","premium_in_$");
10 xgrid;
11 AGE=43;premium_in_$=3.6;plot(AGE,premium_in_$,'r.
        diam');
12 AGE=36;premium_in_$=3;plot(AGE,premium_in_$,'r.diam'
        );
13 plot(25,2.0,'o')
```

Scilab code Exa 10.2 Resistance for given length of wires

```
1
2 clear;
3 clc;
4 close;
5 clf;
6 length1=[100 120 170 220];
7 resistance=[2.5 3 4.25 5.5];
8 plot(length1,resistance,'b--.diam')
9 xtitle("Relation between Resistances and Length",
        length_in_meters","resistance_in_ohms");
10 xgrid;
11 length1=200;
12 resistance=5;
13 plot('length','resistance','b.diam')
14 plot(250,6.21,'b.diam')//this point is called
    extrapolation
```

Scilab code Exa 10.3 to show the relation between time and distance

```
1
2 clear;
3 clc;
4 close;
5 clf;
6 time=[0 1 2 3 4 5];
7 distance=[0 2 8 18 32 50];
8 plot(time,distance,"o-")
9 xtitle("Relation between Time and Distance","time t
        in sec","distance in meters");
10 xgrid;
11 //ex1: distance passed over in 3.6s
12 mprintf("EX1: \nfrom curve, it is 26m. the actual
        distance from formula is 25.92m")
```

```
13 //ex2:time to travel 42m
14 mprintf("EX2: \nline from 42m on distance axis that
    touches the curve at 4.6s.the mechanics formula
    gives 4.58s")
```

Chapter 11

The law of a straight line

Scilab code Exa 11.1 Connection between net profit and number of customers

```
1
2 clear;
3 clc;
4 close;
5 //x-no. of customers. b-the expenses
6 clf;
7 cust=[230 240 270 300 350 380];
8 profit=[0 0.5 2.0 3.5 6.0 7.5];
9 plot(cust,profit,6);
10 plot(230,0,'r->.diam');
11 //profit(y) depends on varying no. of customers(x).
12 xtitle("the straight line graph","no. of customers",
        "profit");
13 xgrid();
14 //ex(1)
15 mprintf("(1) From graph, if x=230, then y=0");
16 //ex(2)
17 mprintf("(2) if no. of customers is <230 then there
        will be a loss")
```

Scilab code Exa 11.2 The law represented by a straight line graph

```
1
2 clear;
3 clc;
4 close;
5 //let a—the avg. amount paid. x—no. of customers. b
   —the expenses
6 //net profit is  $y=ax-b$ 
7 x=320;y=4.50;
8 x=250;y=1.00;
9 //substitute in above equation
10 //4.5=320*a-b—equ.1;1=250*a-b—equ.2. subbtract equ.2
    from 1.
11 a=0.05;//we get
12 b=250*a-1;
13 x=poly(0, 'x');
14 y=a*x-b;//equation to straight line
15 //if there is no profit i.e., y=0
16 for x=1:500
17 if(0.05*x-11.5==0)
18 mprintf("x=%i \n", x)
19 break
20 end
21 end
22 clf;
23 cust=[230 240 270 300 350 380];
24 profit=[0 0.5 2.0 3.5 6.0 7.5];
25 plot(cust,profit,6);
26 plot(230,0, 'r->.diam');
27 //profit(y) depends on varying no. of customers(x).
    the no.'s 0.05 & 11.5 remained constant
28 xtitle("the straight line graph", "no. of customers",
    "profit");
```



```
29 legend("y=0.05*x-11.5");
30 xgrid();
```

Scilab code Exa 11.3 Graph of the given equation

```
1
2 //2*y-4*x=3
3
4 clear;
5 clc;
6 close;
7 x=poly(0, 'x');
8 x=[-2 -1 0 1 1.8 2];
9 y=(3+4*x)/2;
10 x_vs_y=[x;y];
11 plot(x,y,3)
12 plot(0,1.5, 'r.->')//when x=0. 1.5 is intercept on y-
    axis
13 plot(-0.75,0, 'r.->')//when y=0. -0.75 is intercept
    on x-axis
14 xtitle("graph of equation 2y-4x-3", "x axis", "y axis"
    );
15 xgrid;
```

Scilab code Exa 11.4 Graph of the equation

```
1
2 //2*x+y=1
3 clear;
4 clc;
5 close;
6 x=poly(0, 'x');
7 x=[-2 -1 0 1 2 3];
```

```

8 y=1-2*x;
9 x_vs_y=[x;y];
10 plot(x,y,3)
11 plot(0,1,'r.->')// intercept on y-axis
12 plot(0.5,0,'r.->')// intercept on x-axis
13 xtitle("graph of the equation 2x+y=1","x axis","y
    axis");
14 xgrid;

```

Scilab code Exa 11.5 Graphs of straight lines not passing through origins

```

1
2 //y=mx+b
3 clear;
4 clc;
5 close;
6 clf;
7 x=linspace(0,3,4);
8 y=x;
9 plot2d(x,y,1);
10 y=x+2;
11 plot2d(x,y,4);
12 y=x-3;
13 plot2d(x,y,5);
14 xtitle("Equations of the form y=mx+b","x axis","y
    axis");
15 legend("y=x","y=x+2","y=x-3",2);
16 //m is constant, b is fixed distance. (x,y) vary for
    different points on the line
17 xgrid()
18 //ex(1)
19 mprintf("ex(1) In y=4x-7, gradient is 4. Intercept on
    y-axis is -7")
20 //ex(2)
21 mprintf("ex(2) In y=0.05x-11.5, gradient is 0.05 and

```

intercept on y-axis is -11.5")

Scilab code Exa 11.6 Graphical solution of simultaneous equations

```
1
2 //x+2*y=5, 3*x-2*y=7
3 clear;
4 clc;
5 close;
6 x=poly(0, 'x');
7 //graph of x+2*y=5
8 x=[0 -1 2 5];
9 y=(5-x)/2;
10 x_vs_y=[x;y];
11 plot(x,y, 'b--.x');
12 //graph of 3*x-2*y=7
13 x=[0 -1 7/8 4];
14 y=(3*x-7)/2;
15 plot(x,y, 'b--.o');
16 for x=1:100
17     if ((5-x)/2==(3*x-7)/2)
18         break
19     end
20 end
21 mprintf("the solution of the equation is")
22 y=(5-x)/2;
23 mprintf("x=%i\ny=%i ",x,y)
24 plot(x,y, 'r.->')
25 xtitle("graph of simultaneous equations", "x axis", "y
        axis");
26 xgrid;
27 legend("x+2*y=5", "3*x-2*y=7", 4);
```

Chapter 12

Using inequalities to define regions

Scilab code Exa 12.1 Graph the region described by inequalities

```
1
2 //Given : inequalities  $y > x$  and  $y < 2x - 3$ 
3 clc;
4 clear;
5 clf();
6 x=linspace(0,8,8);
7 y=2*x-3; // "points in the region  $y < 2x - 3$  lie below
           the line  $y = 2x - 3$ "
8 plot(x,y,"o-");
9 y=x; // "points in the region  $y > x$  lie above the line  $y$ 
       =x"
10 plot(x,y,"+");
11 x=5; y=6; plot(x,y,'r.diam') //point that lies in the
       region
12 xtitle("region described by inequalities","x axis","
       y axis");
13 legend("2*x-3","x");
14 xgrid;
```

Scilab code Exa 12.2 Finding one point in the region described by inequalities

```
1
2 //Given :Inequalities  $y > x - 2$ ,  $y < 2 * x + 1$  and  $x + y < 6$ 
3 clc;
4 clear;
5 clf();
6 x=linspace(0,9,10);
7 y=x-2;
8 plot2d(x,y,3); //" points in the region  $y > x - 2$  lie
   above the line  $y = x - 2$ "
9 y=2*x+1;
10 plot2d(x,y,5); //" points in the region  $y < 2 * x + 1$  lie
   below the line  $y = 2 * x + 1$ "
11 y=6-x;
12 plot2d(x,y,2); //" points in the region  $x + y < 6$  lie
   below the line  $x + y = 6$ "
13 xtitle("region dscribed by inequalities", "x axis", "y
   axis");
14 legend("x-2", "2*x+1", "6-x", 2);
15 xgrid;
16 //(3,2) is one point from the graph enclosed by
   these inequalities
17 x=3; y=2; plot(x,y, 'b. diam ')
18 if((y>x-2)&(y<2*x+1)&(x+y<6)) //this condition does
   not satisfies the point that lies out of the
   region ex:(7,7)
19 mprintf(' \n point that lies in the region is (%i,%i
   ) \n ',x,y)
20 end
```

Scilab code Exa 12.3 Greatest and least values in the region

```

1
2 //Given : Inequalities  $x+3y \leq 24$ ,  $3x+y < 21$ .
3 clc;
4 clear;
5 clf();
6 x=linspace(0,9,10);
7 y=21-3*x;
8 plot2d(x,y,3); //" points in the region  $y < 21-3x$  lie
   below the line  $y=21-3x$ "
9 y=(24-x)/3;
10 plot2d(x,y,5); //" points in the region  $y \leq (24-x)/3$ 
   lie below or on the line  $y=(24-x)/3$ "
11 xtitle("greatest values in a region", "x axis", "y
   axis");
12 xgrid;
13 printf(" \n from graph, (3,7), (4,6), (5,5) are points
   where  $x+y$  is largest \n");
14 y=10-x; //  $3+7=10, 4+6=10, 5+5=10$  so, all the points lie
   on the line  $x+y=10$ 
15 x=3; y=7; plot(x,y, 'b.diam ');
16 x=4; y=6; plot(x,y, 'b.diam ');
17 x=5; y=5; plot(x,y, 'b.diam ');
18 //" points on the line  $3x+y < 21$  are not included
   since we want  $3x+y < 21$  and not  $3x+y \leq 21$ "
19 legend("  $3x+y < 21$ ", "  $x+3y \leq 24$ ", "  $10-x$ ");

```

Scilab code Exa 12.4 Finding maximum profit with linear programming

```

1
2 //Given: For model A, material(m) cost(c)=4$, labour(
   l) 5$, profit(p) 5$. For model B, m=3$, l=9$, p=6$.
   Altogether 240$ for m and 450$ for l.
3 clc;
4 clear;
5 clf();

```

```

6 //let a is number of model A and b for model B to be
   made
7 //constraints on m & l as pair of inequalities 4a+3b
   <=240,5a+9b<=450.maximize the profit 5a+6b
8 a=linspace(1,100,10);
9 b=(240-4*a)/3;
10 plot2d(a,b,3);
11 b=(450-5*a)/9;
12 plot2d(a,b,5);
13 //find the point in this region where 5a+6b is
   greatest with the parallel lines concept
14 //consider the parallel lines 5a+6b=100 , 5a+6b=150
   , 5a+6b=300 ... the 2nd two are shown on graph \n
   ");
15 b=(150-6*a)/5;
16 plot(a,b,'b--x');
17 b=(300-6*a)/5;
18 plot(a,b,'b--o');
19 // as profit gets larger , profit line moves up to
   the right
20 a=39;b=28;
21 m=5*a+6*b;
22 mprintf('\n the maximum profit %i occurs at (%i,%i
   ) \n',m,a,b);
23 xtitle("Model A vs. Model B ", "Model A", "Model B");
24 xgrid;
25 legend("4a+3b<=240", "5a+9b<=450", "5a+6b=150", "5a+6b
   =300");

```

Scilab code Exa 12.5 Minimum cost of feed

```

1
2 //Given : vitamin A-8units ,B-6units , C- 3units and
   the cost of making composite feed is 120*x+90*y (
   costs of each feed per kg.are 120p &90p)

```

```

3  clc;
4  clear;
5  clf();
6  v=[1 3 1;4 1 1];//rows–feed 1,feed 2  and columns–
    vitamins A,B,C. vitamin content of each feed per
    kilogram
7  // A: $x+4*y \geq 8$ ; B: $3*x+y \geq 6$ ; C: $x+y \geq 3$ . min_cost= $120*x+90*y$ 
8  x=linspace(0,10,10);
9  y= $6-3*x$ ; plot2d(x,y,3);
10 y= $(8-x)/4$ ; plot2d(x,y,6);
11 y= $3-x$ ; plot2d(x,y,5);
12 //the 2 cost lines for 360p and 720p are shown in
    the graph as dotted lines
13 // assume 2 parallel lines  $120*x+90*y=360$  ,  $120*x+90*y=720$ 
14 y= $(360-120*x)/90$ ; plot(x,y, 'b--.x');
15 y= $(720-120*x)/90$ ; plot(x,y, 'b--.o');
16 //lines move down to left as cost decreases.min cost
    occurs at last line that contains atleast 1
    point in the required region
17 x=1;y=3;
18 min_cost= $120*x+90*y$ ;
19 mprintf(" \n minimum cost %i occurs at (%i,%i)",
    min_cost,x,y);
20 xtitle("Feed1 vs. Feed 2","Feed 1","Feed 2");
21 legend("  $3*x+y \geq 6$ " , " $x+4*y \geq 8$ " , " $x+y \geq 3$ " , " $120*x+90*y$ 
    = $360$ " , " $120*x+90*y=720$ " );
22 xgrid;

```

Chapter 13

Multiplication of algebraic expressions

Scilab code Exa 13.1 Product of binomial expressions

```
1
2  clc;
3  clear;
4  close;
5  x=poly(0, 'x');
6  p=(x+6)*(x+5)
7  a=poly(0, 'a');
8  p1=(a+9)*(a+4)
9  p2=(x+2)*(x-7)
10 p3=(a-8)*(a-3)
11 p4=(x-8)*(x-2)
12 p5=(x-8)*(x+2)
13 p6=(x+8)*(x-2)
```

Scilab code Exa 13.2 Multiplication of algebraic expressions

```
1
2 clear;
3 clc;
4 close;
5 x=poly(0, 'x');
6 p1=(2*x+5);
7 p2=(3*x+4);
8 ans=p1*p2
```

Scilab code Exa 13.3 Multiplication of algebraic expressions

```
1
2 clear;
3 clc;
4 close;
5 x=poly(0, 'x');
6 p1=(3*x+7);
7 p2=(2*x+1);
8 p3=p1*p2;
9 disp(p3, "product=")
```

Scilab code Exa 13.4 Multiplication of algebraic expressions

```
1
2 clear;
3 clc;
4 close;
5 x=poly(0, 'x');
6 p1=(7*x-5);
7 p2=(2*x+3);
8 p3=p1*p2;
9 disp(p3, "product=")
```

Scilab code Exa 13.5 Product of algebraic expressions

```
1
2 clear;
3 clc;
4 close;
5 x=poly(0, 'x');
6 p1=(3*x-2);
7 p2=(4*x-7);
8 p3=p1*p2;
9 disp(p3," product=")
```

Scilab code Exa 13.6 Multiplication of a trinomial

```
1
2 clear;
3 clc;
4 close;
5 x=poly(0, 'x');
6 p1=(x+2);
7 p2=(x^2-x+1);
8 p3=p1*p2;//on collecting like terms
9 disp(p3," product=")
```

Scilab code Exa 13.7 Product of a trinomial

```
1
2 //(a+b)*(a^2-ab+b^2)
3 clear;
```

```

4  clc;
5  close;
6  //on collecting like terms
7  val=string('a^3+b^3')

```

Scilab code Exa 13.8 Square of a binomial expression

```

1
2  clc;
3  close;
4  clear;
5  x=poly(0, 'x');
6  p=(x+1)^2
7  p1=(x-1)^2
8  a=poly(0, 'a');
9  p2=(a+9)^2
10 p3=string('(1-5xy)^2=1-10xy+25x^2y^2')
11 p4=string('(2x+7y)^2=4x^2 +28xy +49y^2')
12 p5=string('(3a-10b)^2=9a^2-60ab+100b^2')

```

Scilab code Exa 13.9 Square of a trinomial

```

1
2  clc;
3  close;
4  clear;
5  p1=string('(a+b+1)^2=a^2+b^2+1+2ab+2a+2b')
6  p2=string('(x-y+z)^2=x^2+y^2+z^2-2xy+2xz-2yz')
7  p3=string('(a-b-c)^2=a^2+b^2+c^2-2ab-2ac+2bc')
8  p4=string('(x+y-5)^2=x^2+y^2+25-10x-10y+2xy')

```

Scilab code Exa 13.10 Cube of a binomial

```
1
2 clc;
3 close;
4 clear;
5 x=poly(0, 'x');
6 p=(x+1)^3
7 p1=(x-1)^3
8 a=poly(0, 'a');
9 p2=(a+1)^3
10 p3=(1-a)^3
11 p4=string(' (2x+3y)^3=8x^3+36x^2y+54xy^2+27y^3 ')
12 p5=string(' (x-3y)^3=x^3-9x^2y+27xy^2-27y^3 ')
```

Scilab code Exa 13.11 Product of sum and difference

```
1
2 clc;
3 close;
4 clear;
5 x=poly(0, 'x');
6 p=(x+9)*(x-9)
7 p1=string(' (ab+10)(ab-10)=a^2*b^2-100 ')
8 p2=(4*x+5)*(4*x-5)
9 p3=(1+x)*(1-x)
10 a=poly(0, 'a');
11 p4=(a-1/2)*(a+1/2)
12 p5=string(' (a/3 + b/4)*(a/3 - b/4)=a^2/9 - b^2/16 ')
13 p6=string(' {(a+b)+c}*{(a+b)-c}=(a+b)^2-c^2 ')
14 p7=string(' {a+(b+c)}*{a-(b+c)}=a^2-(b+c)^2 ')
```

Chapter 14

Factors

Scilab code Exa 14.1 factors of given expression

```
1
2 //factors of 6a^2 + 3ac
3 clear;
4 clc;
5 close;
6 p=string('6*a^2+3*a*c ');
7 disp('=> 3a(2a+c)')
```

Scilab code Exa 14.2 Factorize given expression

```
1
2 //5*x^2*y^2-10*x^2*y+20*y^2
3 clear;
4 clc;
5 close;
6 mprintf("\n the highest common factor to each term
          is 5 and other factor is y \n")
7 disp('5y(x^2y-2x^2+4y)')
```

Scilab code Exa 14.3 Finding factors

```
1
2 //factors of a^2+cd+ad+ac
3 clear;
4 clc;
5 close;
6 mprintf("\n (a^2+ac)+(ad+cd) => a(a+c)+d(a+d) \n")
7 mprintf("the factors are:")
8 val=string('(a+c)(a+d)')
```

Scilab code Exa 14.4 Factorize if possible

```
1
2 //factorize , if possible ,ab+ac+bc+bd
3 clear;
4 clc;
5 close;
6 mprintf("\n there are no factors of this expression"
  )
```

Scilab code Exa 14.5 Factors of expression

```
1
2 //factors of ab-5a-3b+15
3 clear;
4 clc;
5 close;
6 //by arrangement into suitable pairs,
```

```
7 mprintf("(ab-5a)-(3b-15) => a(b-5)-3(b-5)")
8 mprintf("\n the factors are: \n")
9 val=string('(b-5)(a-3)')
```

Scilab code Exa 14.6 Factorize the given expression

```
1
2 //x^2+13*x+36
3 clear;
4 clc;
5 close;
6 x=poly(0, 'x');
7 p=x^2+13*x+36;
8 factors(p)
```

Scilab code Exa 14.7 Factorize the given expression in terms of x

```
1
2 //x^2-13*x+36
3 clear;
4 clc;
5 close;
6 x=poly(0, 'x');
7 p=x^2-13*x+36;
8 factors(p)
```

Scilab code Exa 14.8 Factorize the given expression in terms of y

```
1
2 //y^2-13*y+30
```



```
3 clear;
4 clc;
5 close;
6 y=poly(0, 'y');
7 p=y^2-13*y+30;
8 factors(p)
```

Scilab code Exa 14.9 Factorize the expression

```
1
2 //x^2-5*x-36
3 clear;
4 clc;
5 close;
6 x=poly(0, 'x');
7 p=x^2-5*x-36;
8 factors(p)
```

Scilab code Exa 14.10 Factorize

```
1
2 //x^2+12*x-28
3 clear;
4 clc;
5 close;
6 x=poly(0, 'x');
7 p=x^2+12*x-28;
8 factors(p)
```

Scilab code Exa 14.11 Factorize

```

1
2 //a^2-8*a*b-48*b^2
3 clear;
4 clc;
5 close;
6 a=poly(0, 'a');
7 p=a^2-8*a-48;
8 factors(p)
9 mprintf("the second letter b will appear in 1st
   term of each factor")
10 ans(1)="(4b+a)";
11 ans(2)="(-12b+a)"

```

Scilab code Exa 14.12 Factors of expression

```

1
2 //2*x^2+7*x+3
3 clear;
4 clc;
5 close;
6 x=poly(0, 'x');
7 p=2*x^2+7*x+3;
8 factors(p);
9 ans(2)=ans(2)*2;
10 disp(ans(1),ans(2),"the factors of 2*x^2+7*x+3 are")

```

Scilab code Exa 14.13 Factorize of expression

```

1
2 //6*x^2+17*x-3
3 clear;
4 clc;
5 close;

```

```

6 x=poly(0, 'x');
7 p=6*x^2+17*x-3;
8 factors(p);
9 ans(2)=ans(2)*6; //multiply by 6 the p1 factors to
   get the original factors of p
10 disp(ans(1),ans(2),"the factors of 6*x^2+17*x-3 are"
   )

```

Scilab code Exa 14.14 Factorize the given expression

```

1
2 //4*x^2-17*x-15
3 clear;
4 clc;
5 close;
6 x=poly(0, 'x');
7 p=4*x^2-17*x-15;
8 factors(p);
9 ans(2)=ans(2)*4;
10 disp(ans(1),ans(2),"the factors of 4*x^2-17*x-15 are
   ")

```

Scilab code Exa 14.15 Representing square of binomial expression

```

1
2 //x^2+6*x+9
3 clear;
4 clc;
5 close;
6 x=poly(0, 'x');
7 p=x^2+6*x+9;
8 factors(p);

```

```
9 disp(ans(1),"x^2+6*x+9 is square of binomial  
expression ")
```

Scilab code Exa 14.16 Checking complete square or not

```
1  
2 //4*x^2+6*x+9  
3 clear;  
4 clc;  
5 close;  
6 x=poly(0,'x');  
7 p=4*x^2+6*x+9  
8 mprintf("is not a complete square")  
9 //the 1st and 3rd terms are squares of 3and 2x  
10 //for complete square the middle term must be +(2*  
sqrt(4x^2)*sqrt(9))=+12x
```

Scilab code Exa 14.17 Checking complete square or not

```
1  
2 //4*x^2-20*x+25  
3 clear;  
4 clc;  
5 close;  
6 x=poly(0,'x');  
7 p=4*x^2-20*x+25  
8 factors(p);  
9 disp(ans(1)*2,"is the complete square of binomial")  
10 //disp("the 1st and 3rd terms are squares of 5 and 2  
x")  
11 //disp("for complete square the middle term must be  
(2*sqrt(4*x^2)*sqrt(25)=20x")
```

Scilab code Exa 14.18 Factorize

```
1
2 //100*x^2-1
3 clear;
4 clc;
5 close;
6 x=poly(0, 'x');
7 p=100*x^2-1;
8 factors(p);
9 ans(1)=10*ans(1);
10 ans(2)=10*ans(2);
11 disp(ans(1),ans(2),"the factors of 100*x^2-1 are")
```

Scilab code Exa 14.19 Factorize the expression

```
1
2 //36*a^2*b^2-25
3 clear;
4 clc;
5 close;
6 //the numbers squared are 6ab and 5")
7 disp("36*a^2*b^2-25=(6ab+5)(6ab-5)")
```

Scilab code Exa 14.20 Factorize the given expression

```
1
2 //factorize (a+b)^2 - c^2
3 clear;
```

```
4 clc;  
5 close;  
6 //using the formula ,  $a^2-b^2=(a+b)(a-b)$   
7 val=string(' (a+b+c) (a+b-c) ')
```

Scilab code Exa 14.21 Factorize the expression

```
1  
2 //factorize  $(a+b)^2 - (c-a)^2$   
3 clear;  
4 clc;  
5 close;  
6 //using the formula ,  $a^2-b^2=(a+b)(a-b)$   
7 val=string(' (b+c) (2a+b-c) ')
```

Scilab code Exa 14.22 Difference of two squares

```
1  
2 clear;  
3 clc;  
4 close;  
5 function [val]=formulae(a,b)  
6     val=(a+b)*(a-b)  
7 endfunction  
8  
9 val=formulae(47.5,22.5)
```

Scilab code Exa 14.23 Area of ring between two concentric circles

```
1
```

```
2 //area of ring between 2 concentric circles.
3 //given ,r1=97mm,r2=83mm
4 clear;
5 clc;
6 close;
7 r1=97;r2=83;
8 //the area of ring is difference between the areas
   of 2 circles
9 diff_in_area=(r1^2-r2^2);
10 mprintf(" difference in area=%ipi mm^2",diff_in_area)
```

Chapter 15

Fractions

Scilab code Exa 15.1 Algebraic fraction

```
1
2 //simplify (a+b)/(a^2-b^2)
3 clear;
4 clc;
5 close;
6 //as , by formula ,( a^2-b^2)=(a+b)(a-b)
7 mprintf("\n (a+b)/((a+b)(a-b)) => 1/(a-b) \n")
```

Scilab code Exa 15.2 Simplifying the factors

```
1
2 clear;
3 clc;
4 close;
5 x=poly(0, 'x');
6 p1=x^2+4*x-12;
7 p2=x^2+x-6;
8 p=p1/p2
```

Scilab code Exa 15.3 Reduction of fractions

```
1
2 //simplify 3a(a^2-4ab+4b^2)/6a(a^2+3ab-10b^2)
3 clear;
4 clc;
5 close;
6 //the factors 3a(a-2b) are common to numerator &
   denominator.
7 mprintf("\n the fraction is :\n")
8 string('(a-2b)/(2a(a+5b))')
```

Scilab code Exa 15.4 Division of fractions

```
1
2 clear;
3 clc;
4 close;
5 x=poly(0, 'x');
6 p1=x;
7 p2=x+1;
8 p=p1/p2;
9 q1=x^2;
10 q2=x^2-1;
11 q=q1/q2;
12 p/q
```

Scilab code Exa 15.5 Multiplication of fractions

```

1
2 clear;
3 clc;
4 close;
5 x=poly(0, 'x');
6 p1=x^4-27*x;
7 p2=x^2-9;
8 p=p1/p2;
9 q1=x^2+3*x+9;
10 q2=x+3;
11 q=q1/q2;
12 p/q

```

Scilab code Exa 15.6 Subtraction of fractions

```

1
2 //simplify a/(a-b) - a^2/(a^2-b^2)
3 clear;
4 clc;
5 close;
6 //as, (a^2-b^2)=(a+b)(a-b), substitute it.
7 mprintf("\n the fraction is :\n")
8 ans=string('ab/((a+b)(a-b))')

```

Scilab code Exa 15.7 Fraction Subtraction

```

1
2 //3/(a-b)-(2a+b)/(a^2-b^2)
3 clear;
4 clc;
5 close;
6 mprintf("\n on factorizing, the expression becomes \
n");

```

```

7 //3/(a-b)-(2a+b)/(a+b)(a-b) => (3a+3b-2a-b)/(a+b)(a-
  b)
8 string(' (a+2b)/((a+b)(a-b)) ')

```

Scilab code Exa 15.8 Subtraction of fractions

```

1
2
3 clear;
4 clc;
5 close;
6 x=poly(0, 'x');
7 p1=x-1;
8 p2=x^2-x-2;
9 p=p1/p2;
10 q1=x+2;
11 q2=x^2+4*x+3;
12 q=q1/q2;
13 t=p-q;
14 y=numer(t) //numerator of t
15 z=factors(denom(t))//factors of denominator of t (
  more simplified form)
16 disp(" val=(1+2x)/(1+x)(-2+x)(3+x)")

```

Scilab code Exa 15.9 Division of fractions

```

1
2 //x/(x-(1/x))
3 clear;
4 clc;
5 close;
6 x=poly(0, 'x');
7 p1=x;

```

```
8 p2=1/x;  
9 p3=p1-p2;  
10 p=p1/p3
```

Scilab code Exa 15.10 Conversion of R in terms of R1 and R2

```
1  
2 //1/R=1/R1-1/R2. get R  
3 clear;  
4 clc;  
5 close;  
6 disp("R=R1R2/(R2-R1)")
```

Scilab code Exa 15.11 solving simple equations involving algebraic fractions

```
1  
2 clear;  
3 clc;  
4 close;  
5 x=poly(0,'x');  
6 p1=3/(x-2);  
7 p2=5/(x-1);  
8 // given , 3/(x-2)=5/(x-1)  
9 for x=0.0:0.1:10.0  
10 if (3*(x-1)==5*(x-2))  
11     format(7)  
12     x  
13     break  
14 end  
15 end
```

Scilab code Exa 15.12 Solving algebraic fraction for n

```
1
2 clear;
3 clc;
4 close;
5 n=poly(0, 'n');
6 p1=1/(n-2);
7 p2=1/(n-3);
8 p=p1+p2;
9 q=2/n;
10 //given p=q
11 z1=numer(p)*denom(q);
12 z2=numer(q)*denom(p);
13 //As, z1=z2. cancel the terms common on both sides
14 a=z1-z2;
15 n=roots(a)
```

Chapter 16

Graphs of Quadratic Functions

Scilab code Exa 16.1 Circumference of circle

```
1
2 //circumference of circle
3 clear;
4 clc;
5 close;
6 disp('C=2*pi*r')
7 //C-length of circumference.r-the length of radius
8 //2 (2,pi) of these 4 symbols represent constants .
9 disp("the variation of C depends on changes in r")
```

Scilab code Exa 16.2 Graph of given straight line

```
1
2 clear;
3 clc;
4 close;
5 //let a-the avg. amount paid. x-no. of customers. b
   -the expenses
```

```

6 //net profit is y=ax-b
7 x=320;y=4.50;
8 x=250;y=1.00;
9 //substitute in above equation
10 //4.5=320*a-b-equ.1;1=250*a-b-equ.2.subbtract equ.2
    from 1.
11 a=0.05;//we get
12 b=250*a-1;
13 x=poly(0,'x');
14 y=a*x-b;//equation to straight line
15 //if there is no profit i.e., y=0
16 for x=1:500
17 if(0.05*x-11.5==0)
18 mprintf("x=%i \n",x)
19 break
20 end
21 end
22 clf;
23 cust=[230 240 270 300 350 380];
24 profit=[0 0.5 2.0 3.5 6.0 7.5];
25 plot(cust,profit,6);
26 plot(230,0,'r->.diam');
27 //profit(y) depends on varying no. of customers(x).
    the no.'s 0.05 & 11.5 remained constant
28 xtitle("the straight line graph","no. of customers",
    "profit");
29 legend("y=0.05*x-11.5");
30 xgrid();

```

Scilab code Exa 16.3 Straight line equation

```

1
2 //y=mx+b
3 clear;
4 clc;

```

```

5  close;
6  clf;
7  x=linspace(0,3,4);
8  y=x;
9  plot2d(x,y,1);
10 y=x+2;
11 plot2d(x,y,4);
12 y=x-3;
13 plot2d(x,y,5);
14 xtitle("Equations of the form y=mx+b", "x axis", "y
    axis");
15 legend("y=x", "y=x+2", "y=x-3", 2);
16 disp('y=mx+b');
17 //m is constant, b is fixed distance. (x,y) vary for
    different points on the line
18 xgrid()

```

Scilab code Exa 16.4 Graph of a function of second degree

```

1
2  clear;
3  clc;
4  close;
5  clf;
6  x=linspace(-3,3,11);
7  y=x^2;
8  plot2d(x,y,3);
9  xtitle("Parabola curve", "x axis", "y axis")
10 legend("y=x^2");
11 xgrid();

```

Scilab code Exa 16.5 Graph of parabola


```

1
2 clear;
3 clc;
4 close;
5 clf;
6 x=linspace(-3,3,11);
7 y=-x^2;
8 plot2d(x,y,3);
9 xtitle("curve of y=-x^2","x axis","y axis");
10 disp("this curve is parabola");
11 legend("y=-x^2");
12 xgrid();

```

Scilab code Exa 16.6 Curves of different parabolas

```

1
2 //y=ax^2
3 clear;
4 clc;
5 close;
6 clf;
7 x=linspace(-3,3,11);
8 y=2*x^2;
9 plot2d(x,y,3);
10 y=x^2;
11 plot2d(x,y,4);
12 y=x^2/2;
13 plot2d(x,y,5);
14 legend("y=2*x^2","y=x^2","y=x^2/2");
15 xtitle("The curves of y=ax^2","x axis","y axis");
16 //if a is negative, we get corresponding curves
    similar to y=-x^2
17 xgrid();

```

Scilab code Exa 16.7 Curves of given expression

```
1
2 //y=x^2+a or y=x^2-a
3 clear;
4 clc;
5 close;
6 clf;
7 x=linspace(-3,3,11);
8 y=x^2+2;
9 plot2d(x,y,3);
10 y=x^2;
11 plot2d(x,y,4);
12 y=x^2-3;
13 plot2d(x,y,5);
14 legend("y=x^2+2","y=x^2","y=x^2-3");
15 xtitle("Curves of y=x^2 +/- a","x axis","y axis");
16 xgrid();
```

Scilab code Exa 16.8 Change of axis

```
1
2 //y=x^2+a or y=x^2-a
3 clear;
4 clc;
5 close;
6 clf;
7 x=linspace(-3,3,11);
8 y=x^2;
9 plot2d(x,y,3);
10 plot(y=1)
11 legend("y=x^2");
```

```
12 xtitle("Change of axis","x axis","y axis");
13 xgrid();
14 mprintf("axis for  $y=x^2$  becomes axis for  $y=x^2-3$  by
    drawing new x axis 3 units above the original")
```

Scilab code Exa 16.9 Graph of curves

```
1
2 clear;
3 clc;
4 close;
5 clf;
6 x=linspace(-3,4,8);
7  $y=(x-1)^2$ ;
8 plot2d(x,y,3);
9 xtitle("Curve of  $y=(x-1)^2$ ","x axis","y axis");
10 legend(" $y=(x-1)^2$ ");
11 xgrid();
```

Scilab code Exa 16.10 graph of given expression

```
1
2 //129,130,131 examples
3 clear;
4 clc;
5 close;
6 clf;
7 x=linspace(-3,4,8);
8  $y=(x-1)^2-4$ ;
9 plot2d(x,y,5);
10 xtitle("Graph of  $y=(x-1)^2-4$ ","x axis","y axis");
11 legend(" $y=(x-1)^2-4$ ");
12 x=poly(0,'x');
```

```

13 y=(x-1)^2-4;
14 //131 concept
15 disp('At these points curve cuts the axis of x')
16 x=roots(y)
17 xgrid();

```

Scilab code Exa 16.11 Graph of Y

```

1
2 clear;
3 clc;
4 close;
5 clf;
6 x=linspace(-3,5,9);
7 y=2*x^2-3*x-5;
8 plot2d(x,y,5);
9 xtitle("Graph of y=2*x^2-3*x-5","x axis","y axis");
10 x=poly(0,'x');
11 y=2*x^2-3*x-5;
12 // "at these points curve cuts the axis of x"
13 x=roots(y)
14 x=3/4;
15 y=2*x^2-3*x-5; //highest point
16 y=[0 -2 -4 y];
17 plot(x,y,'b--.+');
18 legend("y=2*x^2-3*x-5","axis of symmetry");
19 disp("NOTE:line from lowest point to the x axis is
the axis of symmetry");
20 xgrid();

```

Scilab code Exa 16.12 Graph of parabola

1

```

2 clear;
3 clc;
4 close;
5 clf;
6 x=linspace(-5,4,10);
7 y=12-x-x^2;
8 plot2d(x,y,5);
9 xtitle("Graph of y=12-x-x^2 ", "x axis", "y axis");
10 x=poly(0, 'x');
11 y=12-x-x^2;
12 // "at these points curve cuts the axis of x"
13 x=roots(y)
14 x=-1/2;
15 y=12-x-x^2; //highest point
16 y=[0 2 4 6 8 10 y];
17 plot(x,y, 'b--.pentagram');
18 legend("y=12-x-x^2", "axis of symmetry");
19 //line from highest point to the x axis is the axis
    of symmetry
20 xgrid();

```

Scilab code Exa 16.13 Using graphs to solve quadratic inequalities

```

1
2 //y=x^2-4*x+3.values of x where y>0
3 clear;
4 clc;
5 close;
6 x=poly(0, 'x');
7 y=x^2-4*x+3;
8 x=roots(y)
9 //for y>0, the values of x where y is above x axis
    are x<1 or x>3
10 x=linspace(-2,6,9);
11 y=x^2-4*x+3;

```

```

12 plot2d(x,y,3);
13 xtitle("Using graphs to solve quadratic inequalities
    ", "x axis", "y axis");
14 legend("y=x^2-4*x+3");
15 xgrid();

```

Scilab code Exa 16.14 Using quadratic inequalities to describe regions

```

1
2 //y=x^2-5*x+5
3 clear;
4 clc;
5 clf;
6 close;
7 x=linspace(-2,7,10);
8 y=x^2-5*x+5;
9 plot2d(x,y,3);
10 plot2d3(x,y,7);
11 x=poly(0, 'x');
12 y=x^2-5*x+5;
13 x=roots(y)
14 for x=0:5
15     for y=5:20
16         plot(x,y, 'r.pentagram'); //y>0 region
17     end
18 end
19 xtitle("Using quadratic inequalities to describe
    regions", "x axis", "y axis");
20 xgrid();
21 legend("y=x^2-5*x+5", "y<x^2-5*x+5 region", "y>x^2-5*x
    +5 region",4);

```

Chapter 17

Quadratic Equations

Scilab code Exa 17.1 Solving quadratic equation

```
1
2 //x^2-x-1=0
3 clear;
4 clc;
5 close;
6 x=poly(0, 'x');
7 y=x^2-x-1; // y=0
8 mprintf("the solution is \n")
9 format(7)
10 x=roots(y)
```

Scilab code Exa 17.2 Solving quadratic equation

```
1
2 //3*x^2-5*x+1=0
3 clear;
4 clc;
5 close;
```

```
6 x=poly(0, 'x');
7 y=3*x^2-5*x+1; // y=0
8 mprintf("the solution is \n")
9 format(6)
10 x=roots(y)
```

Scilab code Exa 17.3 Solving equation

```
1
2 clear;
3 clc;
4 close;
5 x=poly(0, 'x');
6 p1=1/(x-1);
7 p2=1/(x+2);
8 y=p1-p2;
9 y1=1/16;
10 a=numer(y)*denom(y1);
11 b=numer(y1)*denom(y);
12 r=a-b;
13 mprintf("the solution is \n");
14 format(6)
15 x=roots(r)
```

Scilab code Exa 17.4 Solution of quadratic equation

```
1
2 //x^2-2*x-15=0
3 clear;
4 clc;
5 close;
6 x=poly(0, 'x');
7 y=x^2-2*x-15; // y=0
```



```
8 mprintf("the solution is \n")
9   mprintf("x=%i, \t", roots(y))
```

Scilab code Exa 17.5 quadratic equation Solution

```
1
2 //9*x*(x+1)=4
3 clear;
4 clc;
5 close;
6 x=poly(0, 'x');
7 y=9*x*(x+1)-4; //y=0
8   mprintf("the solution is \n")
9   mprintf("x=%f, \n", roots(y))
```

Scilab code Exa 17.6 quadratic equation Solution

```
1
2 //5*x^2+9*x-2=0
3 clear;
4 clc;
5 close;
6 x=poly(0, 'x');
7 y=5*x^2+9*x-2;
8 a=5;b=9;c=-2;//from equation we get these values
9 //using the formula - solution of quadratic equation
   ax^2+bx+c=0
10 x=(-b+sqrt(b^2-4*a*c))/(2*a);
11 mprintf("\t x=%f \n \n or ", x)
12 x=(-b-sqrt(b^2-4*a*c))/(2*a);
13 mprintf(" x=%f", x)
```

Scilab code Exa 17.7 Solving the equation

```
1
2 clear;
3 clc;
4 close;
5 x=poly(0, 'x');
6 p1=1/(x-1);
7 p2=2/3;
8 p3=2/(x-3);
9 p=(p1+p2-p3);
10 p=3*numer(p); //As p=0 and to remove fractions ,
    multiply by 3
11 a=2;b=-11;c=3; //from equation we get these values
12 //using the formula - solution of quadratic equation
    ax^2+bx+c=0
13 mprintf("the solution is")
14 format(6)
15 x=(-b+sqrt(b^2-4*a*c))/(2*a)
16 mprintf(" or \n")
17 x=(-b-sqrt(b^2-4*a*c))/(2*a)
```

Scilab code Exa 17.8 Time taken when body is projected vertically upwards

```
1
2
3 //given u=160,g=10,h=240
4 clear
5 clc
6 close
7 //using the formulae "h=u*t-(g*t^2)/2"
8 u=160;
```

```

9 g=10;
10 h=240;
11 t=poly(0, 't');
12 r=(240-u*t+(g*t^2)/2)//u*t-(g*t^2)/2-h=0
13 a=5;b=-160;c=240;//from equation we get these values
14 //using the formulae - solution of quadratic
    equation ax^2+bx+c=0
15 t=(-b+sqrt(b^2-4*a*c))/(2*a);
16 t1=(-b-sqrt(b^2-4*a*c))/(2*a);
17 mprintf("\n the solution is t=%f or t=%f\n",t,t1)
    //the answer given in textbook is wrong

```

Scilab code Exa 17.9 Speed and time for journey

```

1
2 clear;
3 clc;
4 close;
5 //let x km/hr is avg. speed for 1st journey
6 //as velocity=distance/time, time for 1st journey is
    84/x hrs
7 //speed for return journey is 84/(x+4).from given
    data, this is <1/2 hr than the 1st time
8 x=poly(0, 'x');
9 //In algebraic form,(84/x)-(84/(x+4))=1/2
10 y=(84/x)-(84/(x+4))-1/2; //y=0. so, numerator=0
11 x=roots(numer(y));
12 //velocity can't be in negatives.take +ve root
13 disp("avg. speed for 1st journey is x=24km/h")
14 distance=84;//given
15 velocity=24;//found
16 time=distance/velocity;//time for 1st journey
17 time1=distance/(velocity+4);//time for 2nd journey
18 mprintf("total_time=%fhours",time+time1)

```

Scilab code Exa 17.10 Solving first degree equations

```
1 //x+y=1, 38x^2-x*y+y^2=37
2
3 clear;
4 clc;
5 close;
6 x=poly(0, 'x');
7 y=1-x;
8 //substitute y=1-x in equ. 38x^2-x*y+y^2=37
9 Y=3*x^2-x*(1-x)+(1-x)^2-37;
10 x=roots(Y);
11 y=1-x;
12 mprintf('the solutions are: \n')
13 mprintf(" (%f,%f) \n",x,y)
```

Scilab code Exa 17.11 Solving symmetric equations

```
1
2
3 //x+y=19, xy=84
4 clear;
5 clc;
6 close;
7 x=poly(0, 'x');
8 //substitute y=19-x in xy=84
9 Y=x*(19-x)-84;
10 x=roots(Y);
11 y=19-x;
12 mprintf('the solutions are: \n')
13 mprintf(" (x,y)=(%i,%i) \n",x,y)
```

Scilab code Exa 17.12 Solving the equations

```
1
2 //x^2+y^2=89, xy=40
3 clear;
4 clc;
5 close;
6 x=poly(0, 'x');
7 //substitute y=40/x in x^2+y^2=89
8 Y=x^2+(40/x)^2-89;
9 x=roots( numer(Y)); //Y=0, numerator=0
10 y=sqrt(89-x^2);
11 mprintf('the solutions of (x,y) are: \n')
12 xy=[x,y]
```

Scilab code Exa 17.13 Solving quadratic inequalaities

```
1
2 //x^2-6*x+8<0
3 clear;
4 clc;
5 close;
6 x=poly(0, 'x');
7 y=x^2-6*x+8;
8 //the product is negative only if either one of the
   factors is negative
9 f=factors(y); //these factors are <0
10 //f(1)>0 and f(2)<0 \n \t or \t \n f(1)<0 and f(2)>0
11 x=string(-2:7); //by number line method,
12 n=string('<'+strcat(x, '~~~')+>') // -2 to 7 no. line
13 n1='<'; n2='';
14     for x=-2:2
```

```

15     n1=n1+'-----';
16     end
17     for x=2:8
18         n2=n2+'+++';
19     end
20     mprintf(n1+n2+'>'+'      '+'(x-2)'+'\n')
21 n1='<';n2='';
22     for y=-2:4
23         n1=n1+'-----';
24     end
25     for y=4:8
26         n2=n2+'+++';
27     end
28     mprintf(n1+n2+'>'+'      '+'(x-4)'+'\n')
29
30 // from diagram, (x-2) is +ve when x>2 & -ve when x
    // <2 by using + ans - signs. same in the case of (x
    // -4)
31     mprintf("\n solution of x^2-6*x+8<0 is \n 2<x<4"
    )

```

Scilab code Exa 17.14 Solving the inequality

```

1
2 // (2*x-1)(x+2)(3-x)>0
3 clear;
4 clc;
5 close;
6 x=string(-4:5); //by number line method
7 n=string('<'+strcat(x, '~~~')+ '>') // -2 to 7 no.
    line
8 n1='<';n2='';
9     for x=-4:1
10         n1=n1+'-----';
11     end

```

```

12         for x=0.5:5
13             n2=n2+'++++';
14         end
15         mprintf(n1+n2+'>'+'+'+'(2x-1)')
16 n1='<';n2='';
17         for y=-4:-2
18             n1=n1+'-----';
19         end
20         for y=-2:5
21             n2=n2+'++++';
22         end
23         mprintf(n1+n2+'>'+'+'+'(x+2)')
24 n1='<';n2='';
25         for y=-4:3
26             n1=n1+'++++';
27         end
28         for y=3:5
29             n2=n2+'-----';
30         end
31         mprintf(n1+n2+'>'+'+'+'(3-x)'+'\n')
32         mprintf("the solution is 0.5<x<3 \n or \n x
<-2")

```

Chapter 18

Indices

Scilab code Exa 18.1 Graph of exponential function

```
1
2 clear;
3 clc;
4 close;
5 clf;
6 x=[0 1 2 3 4];
7 y=2^x;
8 xtitle("Graph of 2^x", "x-axis", "y-axis");
9 plot(x,y, "o-");
10 legend("y=2^x");
11 xgrid();
```

Scilab code Exa 18.2 Operations with standard forms

```
1
2 clear;
3 clc;
4 close;
```



```
5 //EX(1):
6 function [val]=answer(u,v,x,y)
7     val=u*v*10^(x+y)
8 endfunction
9 val=answer(1.2,2.3,4,3)
10
11 //EX(2):
12 function [val1]=answer1(u,v,x,y)
13     val1=(u/v)*10^(x-y)
14 endfunction
15 val1=answer1(4.8,1.6,8,3)
```

Chapter 19

Logarithms

Scilab code Exa 19.1 Finding values from the graph

```
1
2 clear ;
3 clc;
4 close;
5 clf;
6 x=linspace(0,1,7);
7 y=10^x;
8 plot2d(x,y,2);
9 xtitle(" graph of y=10^x","x axis","y axis");
10 legend("y=10^x");
11 xgrid()
12
13 //ex1:1.8*2.6=? ,from graph
14 //1.8=10^0.26 \n 2.6=10^0.42
15 x=10^0.26;y=10^0.42;
16 format(4)
17 ex1_ans=x*y//from the graph
18
19 //ex2:9^(1/3)
20 //9=10^0.96
21 x=10^0.96;
```

```
22 format(4)
23 ex2_ans=x^(1/3)//third law of indices
```

Scilab code Exa 19.2 Notation for logarithms

```
1
2 clear;
3 clc;
4 close;
5 ans1=log10(56.2)
6 ans2=log2(1024)
7 ans3=log10(1000)
8 ans4=log10(81)/log10(3)
```

Scilab code Exa 19.3 Antilogarithm

```
1
2 //no. whose logarithm is 2.3714
3 clear;
4 clc;
5 close;
6 mantissa=0.3714;
7 disp("from anti-logarithm table ,corresponding no. is
      2352")
8 // As,characteristic is 2,no. must lie between 100 &
      1000.\n \n hence 3 significant figures in the
      intergral part
9 235.2
```

Scilab code Exa 19.4 Logarithm of x

```

1
2 //value of (57.86*4.385)
3 clear;
4 clc;
5 close;
6 //log(p*q)=log(p)+log(q)
7 p=57.86;q=4.385;
8 logx=log10(p)+log10(q);
9 format(6)
10 x=10^logx

```

Scilab code Exa 19.5 Finding the logarithm

```

1
2 //value of (5.672*18.94)/1.758
3 clear;
4 clc;
5 close;
6 //log(p*q)=log(p)+log(q) , log(p/q)=log(p)-log(q)
7 p=5.672;q=18.94;r=1.758;
8 logx=log10(p)+log10(q)-log10(r);
9 format(6)
10 x=10^logx

```

Scilab code Exa 19.6 Finding the Nth root

```

1
2 //5th root of 721.8
3 clear;
4 clc;
5 close;
6 //log(a)^n=n*log(a)
7 p=721.8;n=1/5;

```

```
8 logx=n*log10(p);
9 format(6)
10 x=10^logx
```

Scilab code Exa 19.7 Finding the logarithms of given numbers

```
1
2 //logs of 0.3185,0.03185,0.003185
3 clear;
4 clc;
5 close;
6 x=0.3185;y=0.03185;z=0.003185;
7 logx=log10(0.3185)
8 logy=log10(0.03185)
9 logz=log10(0.003185)
```

Scilab code Exa 19.8 Finding the number whose log value is given

```
1
2 //no. with logarithm -3.5416
3 clear;
4 clc;
5 close;
6 mantissa=0.5416;
7 disp("from anti-logarithm table , corresponding no.is
      3840 ")
8 //characteristic is -3.\n \n hence there will be 2
      zeros after the decimal point
9 val=0.003480
```

Scilab code Exa 19.9 Sum of logarithms

```
1
2 //sum of logarithms -1.6173,-2.3415,-1.6493,-0.7374
3 clear;
4 clc;
5 close;
6 x=.6173;y=.3415;z=.6493;a=0.7374;//mantissa's of all
   4 logarithms
7 mantissa=x+y+z+a;
8 //2 which is carried forward from the addition of
   mantissa is +ve.
9 characteristic=-1-2-1-0+2;//characteristic part of
   all 4 logarithms
10 mprintf("sum=--%f",mantissa)
```

Scilab code Exa 19.10 Difference of logarithms

```
1
2 //logarithm : -1.6175-(-3.8463)
3 clear;
4 clc;
5 close;
6 mantissa=1.6175-0.8463;
7 //in borrowing to subtract 8 from 6, -1(
   characteristic) becomes -2
8 characteristic=-2-(-3);
9 mantissa+characteristic
```

Scilab code Exa 19.11 Multiplication of logarithm

```
1
2 //logarithm : multiply -2.8763 by 3
```

```

3 clear;
4 clc;
5 close;
6 num=2.8763; //given
7 mantissa=0.8763;
8 mul=mantissa*3;
9 //when mantissa is multiplied, 2 is carried forward.
   (-2)*3=-6. the characteristic becomes -6+2=-4
10 val=-4.6289

```

Scilab code Exa 19.12 Multiplication of logarithm

```

1
2 //logarithm: -1.8738*1.3
3 clear;
4 clc;
5 close;
6 //multiply mantissa & characteristic seperately and
   add results
7 x=0.8738*1.3;
8 y=-1*1.3;
9 //as y=-1.3 is -ve, change it to -2.7 to make
   mantissa +ve
10 y=-2.7;
11 mantissa_sum=0.13594+0.7; //of x & y
12 characteristic_sum=1-2;
13 characteristic_sum-mantissa_sum

```

Scilab code Exa 19.13 Division of logarithm

```

1
2 //divide -5.3716 by 3
3 clear;

```

```
4 clc;  
5 close;  
6 //characteristic=-5=-6+1 or the log as -6+1.3716  
7 characteristic=-6/3;  
8 mantissa=1.3716/3;  
9 characteristic-mantissa
```

Scilab code Exa 19.14 Finding the logarithm

```
1  
2 //log50 to the base e  
3 clear;  
4 clc;  
5 close;  
6 log(50)//natural logarithm  
7 // or , log50_base_e=log10(50)*2.3026
```

Chapter 21

Variation

Scilab code Exa 21.1 Graph of spring extension for different weights

```
1
2 //spiral spring example
3 clc;
4 clear;
5 close;
6 clf();
7 weight=linspace(0,0.5,6);
8 extension=[0 0.15 0.3 0.44 0.6 0.75];
9 plot2d(weight,extension,13);
10 xtitle("spiral spring example","vaues of L","values
    of E");
11 xgrid();
12 //Extension varies directly as the attached load
13 //let E=Extension,L=Load
14 //to find 'k',a pair of values is taken at point p
15 L=0.5;E=0.75;
16 plot(L,E,'r..');
17 legend("E=KL","POINT P",2);
18 //substitute 'p' in E=K*L
19 K=E/L;
20 mprintf("the law is : \n E= %fL \n",K)
```

Scilab code Exa 21.2 Comparison of voltmeters

```
1
2 //voltmeters example
3 clc;
4 clear;
5 close;
6 clf();
7 C=[1.9 2.75 3.8 4.8 5.8];
8 K=[5.75 8.3 11.2 14 16.8];
9 //C and K are connected by the law of the form  $K=mC+b$ 
10 plot2d4(C,K,3);
11 plot(3.4,10,'r.pentagram');
12 plot(5.3,15.5,'r.pentagram');
13 xtitle("voltmeters graph","C","K");
14 xgrid();
15 legend("K=mC+b","POINTS A,B",2);
16 //substituting A,B points in  $K=mC+b$ , we get
17 //10=3.4m+b ----->equ(1) ; 15.5=5.3m+b ----->equ
    (2)
18 //substracting
19 m=(10-15.5)/(3.4-5.3);
20 b=10-(3.4*m);
21 mprintf("the law is: \n K=%fC+%f",m,b)
```

Scilab code Exa 21.3 Inverse variation

```
1
2 //y varies as cube root of x
3 clear;
```

```

4  clc;
5  close;
6  //y=k*x^(1/3)
7  y=3;x=64; //given
8  k=y/(x^(1/3));
9  mprintf(" (1) y=0.75*x^(1/3)");
10 //when y=15/4,x=?
11 x=(15/4)^3/(0.75)^3;
12 mprintf(" (2) x=%i" ,x)

```

Scilab code Exa 21.4 Time of vibration of simple pendulum

```

1
2 //time of vibration of pendulum varies as sqrt(
   length)
3 clear;
4 clc;
5 close;
6 //let l=length of pendulum in meters, t=the time of
   variation
7 //t=k*sqrt(l) => vibration of pendulum varies as
   sqrt(length)
8 l=1;t=1; //given
9 k=t/(sqrt(l));
10 l=1.06; //given
11 format(5);
12 time_in_sec=k*sqrt(l)

```

Scilab code Exa 21.5 Triangle area

```

1
2 //A=b*h/2
3 clear;

```

```

4  clc;
5  close;
6  //A= the area of triangle.b=the length of base.h=the
    corresponding altitude
7  // A depends on both b &h
8  mprintf(" \n A=k*b*h \n ")
9  k=1/2

```

Scilab code Exa 21.6 Volume varies inversely with peressure

```

1
2  //volume of mass os gas at const. temp. varies
    inversly as pressure on it
3  clear
4  clc
5  close
6  //v=volume
7  //T=absolute temperature
8  //P=pressure
9  mprintf(" \n v=k*T/P \n")

```

Scilab code Exa 21.7 Relation between R and l

```

1
2  //resistance of a current wire varies as length
    varies also , varies inversly as the cross section
    of wire
3  clear
4  clc
5  close
6  //R=the resistance
7  //l=the length
8  //the cross section

```

```
9 mprintf("\n R=k*I/A \n ")
```

Scilab code Exa 21.8 Joint variation

```
1
2 clear;
3 clc;
4 close;
5 // y varies directly as x and inversly as z^3
6 mprintf("\n y=k*x/z^3 \n")
7 x=15;z=12;y=1/36;//given
8 //substituting given values
9 format(5)
10 k=y*z^3/x
```

Scilab code Exa 21.9 F varies directly with strength and inversely with distance

```
1
2 clear;
3 clc;
4 close;
5 // force of 2 magnetic poles varies as product of
   their strength & inversly as square of distance
   between them
6 //F=the force. m1,m2=the pole strengths. d=the
   distance apart
7 mprintf("\n F=k*m1*m2/d^2 \n")
8 F=3;m1=8;m2=6;d=4;//given
9 k=F*d^2/(m1*m2);
10 m1=5;m2=9;d=2;
11 Force_in_newtons=k*m1*m2/d^2
```

Chapter 22

The determination of Laws

Scilab code Exa 22.1 Plotting against power of a number

```
1
2 //y=a*x^2+b
3 clear;
4 clc;
5 close;
6 clf;
7 x=[0 0.5 1 1.5 2 2.5];
8 y=[-10 -9.25 -7 -3.25 2 8.75];
9 plot2d(x^2,y,3);
10 xtitle("Graph of y=ax^2+b","x axis","y axis");
11 xgrid;
12 //the values of a & b can be found by substituting
    two suitable points(x,y)in a*x^2+b-y=0
13 x=1;y=-7;//p1=-a+b+7
14 x=4;y=2;//p2=4*a+b-2
15 a=poly(0,'a');
16 p=-a+7-(4*a-2);
17 a=roots(p);
18 x=1;y=-7;
19 b=y-a*x^2;
20 x=poly(0,'x');
```

```

21 //(or) by inspection of graph, intercept on y-axis
    is (i.e., b) is -10 and a, the gradient of the
    line, is 3
22 mprintf("\n Hence, the law is\n")
23 x=poly(0, 'x');
24 y=3*x^2-10
25 mprintf("or by solving by the method of Section 185"
    )
26 y=a*x^2+b

```

Scilab code Exa 22.2 Law connecting the logarithms

```

1
2 //y=a*x^n
3 clear;
4 clc;
5 close;
6 clf;
7 x=[18 20 22 24 25];
8 y=[623 863 1160 1519 1724];
9 //taking log on both sides for y=a*x^n =>log(y)=n*
    log(x)+log(a) .... equ(1)
10 logx=log10(x);
11 logy=log10(y);
12 plot2d(logx,logy,13);
13 //select points A & B on straight line.
14 plot(1.398,3.236, 'r.diam');
15 plot(1.255,2.795, 'r.diam');
16 n=poly(0, 'n');
17 //3.236=1.398*n+log(a). substitute point A in equ
    ... (1), GIVES equ(3)
18 //2.795=1.255*n+log(a). substitute point B in equ
    ... (1), GIVES equ(4)
19 //equ(3)-equ(4)
20 p=(3.236-1.398*n)-(2.795-1.255*n);

```

```
21 n=roots(p);
22 mprintf("y=a*x^n")
23 format(5)
24 a=10^(2.795-1.255*n)
25 xtitle("graph of y=a*x^n ", "log x ", "log y ");
26 legend("y=a*x^n", "points A,B", 2);
27 xgrid;
28 mprintf("\n y=0.08*x^3.08\n "); //substituting a,n
    values in y=a*x^n
```

Chapter 23

Rational and Irrational Numbers

Scilab code Exa 23.1 Operation with surds

```
1
2 //ex(1) (sqrt(5)+sqrt(20))
3 clear;
4 clc;
5 close;
6 val=string('(sqrt(5)+sqrt(20))');
7 if((sqrt(5)+sqrt(20))==3*sqrt(5))
8     val_1=evstr(val)
9 end
10 //ex(2) sqrt(27)-sqrt(75)+sqrt(48)
11 val=string('sqrt(27)-sqrt(75)+sqrt(48)');
12 val_2=evstr(val)
```

Scilab code Exa 23.2 Rationalise

```
1
```

```

2 //1/(sqrt(5)-sqrt(2))
3 clear;
4 clc;
5 close;
6 //rationalising the denominator
7 function [denom1]=inputs(a,b)
8     denom1=(sqrt(a)+sqrt(b))*(sqrt(a)-sqrt(b))
9 endfunction
10 [denom1]=inputs(5,2);
11 denom1=string(denom1);
12 numer1=string('(sqrt(5)+sqrt(2))');
13 val=string(numer1+'/' +denom1)
14 mprintf("i.e.,")
15 val=evstr(val)

```

Scilab code Exa 23.3 Simplify surds

```

1
2 //((sqrt(5)-1)/(sqrt(5)+1))
3 clear;
4 close;
5 clc;
6 //rationalising the denominator
7 function [denom1]=inputs(a,b)
8     denom1=(sqrt(a)+sqrt(b))*(sqrt(a)-sqrt(b));
9 endfunction
10 [denom1]=inputs(5,1);
11 denom1=string(denom1);
12 numer1=string('(6-2*sqrt(5))');
13 val=string(numer1+'/' +denom1)
14 mprintf("i.e.,")
15 val=evstr(val)

```

Chapter 24

Arithmetical and Geometrical Series

Scilab code Exa 24.1 Arithmetic series

```
1
2 clc;
3 clear;
4 close;
5 //ex(1) 7,13,19,25....
6 common_diff=19-13
7 //ex(2) 6,4,2,0,-2
8 common_diff=2-4
```

Scilab code Exa 24.2 Nth term in arithmetic series

```
1
2 clc;
3 clear;
4 close;
5 //ex(1) in the series 7,10,13,.... the common
   difference is 3. 10th term is ?
```

```

6 nth_term=string('7+(n-1)*3')
7 term10=7+(10-1)*3
8 //ex(2) i the series 6,2,-2,-6,...and d=-4
9 nth_term=string('6-(n-1)*4')
10 term8=6+(8-1)*-4

```

Scilab code Exa 24.3 Arithmetic mean

```

1
2 //insert 3 A.M's between 4 and 20
3 clc;
4 clear;
5 close;
6 //let 4,a,b,c,20 are in A.P. using, l=a+(n-1)*d
7 d=(20-4)/(5-1);
8 a=4+d;
9 b=a+d;
10 c=b+d;
11 mprintf("the five terms are 4,%i,%i,%i,20",a,b,c)

```

Scilab code Exa 24.4 Finding common difference in AP

```

1
2 //sum of A.P of 8 terms is 90.1st term is 6.
3 clear;
4 clc;
5 close;
6 // using s=n*(2*a+(n-1)*d)/2
7 //substituting given values
8 for d=0:0.001:100
9     if(90==8/2*(2*6+(8-1)*d))
10 format(5)
11 d

```

```
12     break
13 end
14 end
```

Scilab code Exa 24.5 Finding n value in arithmetic sum

```
1
2 clear;
3 clc;
4 close;
5 // using  $s=n\{2*a+(n-1)*d\}/2$ 
6 a=3;d=3;s=135;
7 //substituting given values
8 n=poly(0, 'n');
9 p=n/2*{6 + (n-1)*3}-135;
10 n=roots(p)
11 mprintf("\n As root -10 is inadmissible , the
           solution is n=9")
```

Scilab code Exa 24.6 Geometric series

```
1
2 clc;
3 clear;
4 close;
5 //ex(1). 1,2,4,8,...
6 common_ratio=4/2
7 //ex(2). 1,1/2,1/4,1/8,....
8 common_ratio=(1/4)/(1/2)
9 //ex(3). 2,-6,18,-54
10 common_ratio=-6/2
11 //ex(4). R,R^2,R^3,R^4....
12 R=poly(0, 'R');
```

13 `common_ratio=R^2/R`

Scilab code Exa 24.7 Seventh term of given series

```
1
2 //7th term of the series 3,6,12,....
3 clear;
4 clc;
5 close;
6 //in the series r=2, so using the formula
7 // nth term=a*r^(n-1)
8 a=3;n=7;//given data
9 term7=3*(2)^(7-1);
10 mprintf("\n the seventh term of the series is %i",
    term7)
```

Scilab code Exa 24.8 Eighth term of given series

```
1
2 //8th term of the series 2,-6,18,-54,.....
3 clear;
4 clc;
5 close;
6 //in the series r=-3, so using the formula
7 // nth term=a*r^(n-1)
8 a=2;n=8;//given data
9 term8=2*(-3)^(8-1);
10 mprintf("\n the eighth term of the series is %i",
    term8)
```

Scilab code Exa 24.9 Finding the 5th term

```
1
2 //5th term of the series.1st term is 100 and common
   ratio(r) is 0.63
3 clear;
4 clc;
5 close;
6 // using the formula
7 //nth term=a*r^(n-1)
8 a=100;n=0.63;//given data
9 mprintf("\n the fifth term of the series is \n")
10 format(6)
11 term5=100*0.63^(5-1)
```

Scilab code Exa 24.10 Finding the common ratio

```
1
2 //3rd term of G.P is 4.5 and 9th is 16.2
3 clear;
4 clc;
5 close;
6 // nth term=a*r^(n-1)
7 term3=4.5;//given data
8 // 'a*r^(3-1)=4.5 ---equ(1) '
9 term9=16.2;//given
10 // 'a*r^(9-1)=16.2 ---equ(2) '
11 mprintf("\n the common ratio is :\n");
12 format(7)
13 r=(16.2/4.5)^(1/6)//equ(2)/equ(1)
```

Scilab code Exa 24.11 Sum of seven terms of the series

```

1
2 //sum of 7 terms of the series 2,3,4,5,....
3 clear;
4 clc;
5 close;
6 r=3/2;a=2;n=7;//given
7 //using the formula
8 S=string('a*(r^(n)-1)/(r-1)')
9 disp("substituting the given values ")
10 format(6)
11 Sum=evstr(S)

```

Scilab code Exa 24.12 Sum of 7 terms

```

1
2 //sum of 7 terms of the series 4,-8,16,....
3 clear;
4 clc;
5 close;
6 r=-8/4;a=4;n=7;//given
7 //using the formula
8 S=string('a*(r^(n)-1)/(r-1)');
9 //substituting the values
10 Sum=evstr(S)

```

Scilab code Exa 24.13 Sum of infinite terms

```

1
2 //sum to infinity series 2 + 1/2 + 1/8 + .....
3 clear;
4 clc;
5 close;
6 a=2;r=1/4;//given

```



```
7 //using the formula
8 S_infinity=string('a/(1-r)');
9 Sum=evstr(S_infinity)
```

Scilab code Exa 24.14 Sum to infinity of the series

```
1
2 //sum to infinity series  $5 - 1 + 1/5 - \dots$ 
3 clear;
4 clc;
5 close;
6 a=5;r=-1/5;//given
7 //using the formula
8 S_infinity=string('a/(1-r)');
9 Sum=evstr(S_infinity)
```
