Simultaneous linear equation:ax+by=c,px+qy=r

Solve using the substitution method if any one of a,b.p,q equals 1.otherwise use the elimination method by making the coefficients of either x or y equal.the solution gives the coordinates of the point where the two lines meet.if the lines are parallel there is no solution.

Quadratic equations: ax+bx+c=0.

if possible factorize the left hand side and use the AB=0 principle.

there will be two roots,different or equal or no real roots.

If factorization is not possible,solve by completing the square or use the formula x = -b write the equation in standard form and note the values of a,b and c.

Simultaneous linear and quadratic equations:

Isolate one of the variables from the linear equation and substitute in the quadratic .solve the quadratic obtained

Two pairs of solutions may be obtained but only one pair if the line is a tangent to the curve given by the quadratic.

Look out for special cases in which the second degree terms of the quadratic may be factorized



Find the roots of the equation x+4/x+2 = x+5/2 correct to 2 decimal places

1. Put the equation into standard form.
2. Remove the fractions by multiplying both sides by the l.c.m. 2(x+2). Then 2(x+4) = (x+5) (x+2 = 2x+8=x²+7x+10 which gives x²+5x+2=0.then a=1,b=5,c=2.hence x=-5/2 = -5/2 = -5/2.the roots are -5+4.123/2=-0.877/2=-0.44 and -5-4.123/2=-9.123/2=-4.56.each correct to 2 decimal places.note : most likely you will prefer to solve quadratic equations by the formula,if the method of factorization does not work.on the whole is the direct method.however,it is essential for later use to know how to complete the square on expressions like ax² +bx ; such as finding the maximum or minimum values of a quadratic function or in dealing with the equation of a circle in coordinate geometry.

If means ad-bc,solve the equation =0 giving the roots 2 decimal places.

Solve the equation x+y=5 (i) x²+y²=13 (ii) note (i) is a linear equation but (ii) is a quadratic in x and y.graphically (ii) will represent a curve in this case a circle and a line cut a circle in at most 2 points.we should therefore expect 2 sets of solutions. Show fig.



A general method of solution is to make one of the variables the subject of the linear equation,then substitute this value in the non-linear equation.we obtain a quadratic in the other variable.

From (i) we obtain x=5-y (iii)

Then in (ii) (5-y)²+y²=13

Which gives 25-10y+y²+y²=13

Or 2y²-10y+12=0

Or y²-5y+6=0 hence (y-3)(y-2)=0,giving y=3 or y=2

Obtain x from (iii): x=2 or 3

The two sets of solutions are thus: x=2,y=3 or x=3,y=2.

So the coordinates of the points where the line (i) cuts the circle (ii) are (2,3) and (3,2)

Find the points of intersection of the line 3x+2y=10 (i) with the curve x²-xy+y²=21 (ii).

From (i) obtain y=10-3x/2 (iii) which we substitute in (ii):

x²-x + (10-3x/2)² = 21

x²-x(10-3x)/2 + 100-60x+9x²/4 = 21.

Clearing fractions,4x²-2x(10-3x) + 100-60x+9x²=84

And so finally,19x²-80x+16=0 (iv)

Factorise (iv) and obtain (19x-4)(x-4)=0 and the solutions are x=4/19,y=89/19, or x=4,y=-1.

Hence the points of intersection are (4/19,89/19) and (4,-1)

Note : for (iii) we made y the subject,but equally we could have chosen x: either gives a fraction for substitution in (ii). In practice ,choose the subject so as not to have a fraction,if possible.

Special cases

Solve 3x-2y=4,6x²-xy-2y²+36=0

3x-2y=4 (i)

6x²-xy-2y²+36=0 (ii)



Factorise the second degree terms in (ii):3x-2y)(2x+y)+36=0 and from (i) 3x-2y=4.therefore,4(2x+y)+36=0,which gives 2x+y+9=0 (iii).now solve (i) and (iii).we obtain x=-2,y=-5,only one set of solution.

Solve x+3y=2,x²-2xy+y²=36.note that the second equation is really (x-y)²=36 and thus x-y=now solve the pairs of simultaneous equations.

X+3y=2 (i), x-y=6 (ii) and x+3y=2 (i),x-y=-6 (ii) to obtain the solutions : x=5,y=-1,and x=-4,y=2.

Functions

A function f is a rule which relates or maps an input onto just one output.for example,the function f:x2x-1.

This reads:the function f such that (:) any input x is mapped onto () the value 2x-1,so if the input was 3,that is( x=3) the output or image of 3 would be f(3)=2x3-1=5.

The process can be illustrated like this

Input function output or image of x

X y=f(x)=2x-1

Y f(3)=5

As the values of x are chosen first,we call x the independent variable.each value of x will have just one image,the corresponding value of y( =f(x) ).y is called the dependent variable.for certain functions,however,some values of x may have no image and these are called discontinuous functions.

Other letters may be used for functions,for example g(x)=2x+3,….

If f(x)=2 – 3x + 1,find the values of f(0),f(-1),f(t),f(2x)

F(0)=2x0²-3x0+1=1,so the image of 0 for this function is 1.

F(-1)=2x-3x(-1)+1=2

F(t)=-3t+1

F(2x)=2x-3x(2x)+1=-6x+1

If f(x) =x+1/x²+x+2,find (a) the image of -1 and (b) f(x-1).what values of x will have no images for this function?

Polynomials

A polynomial is the sum of separate terms of positive powers of a variable with a constant term(which may be zero)

