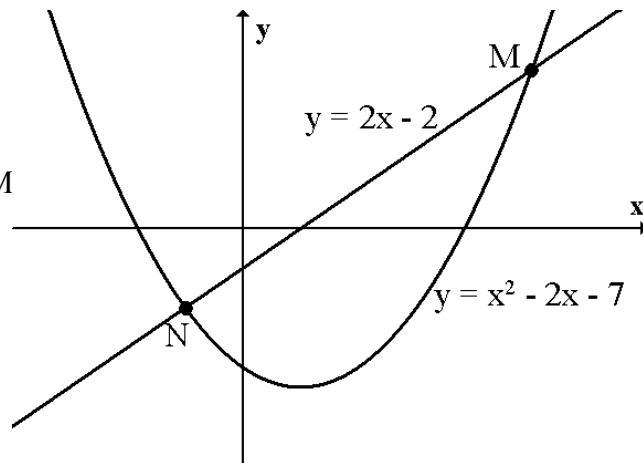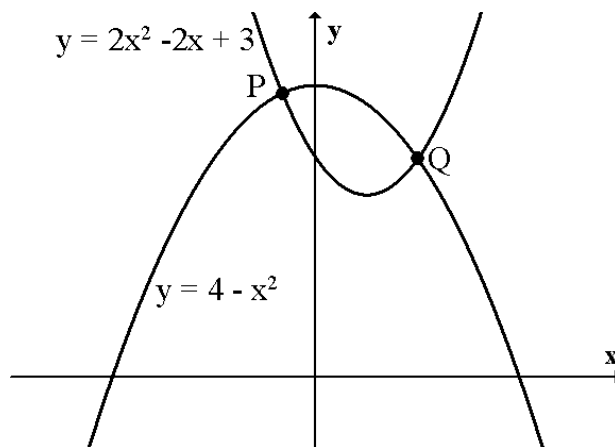# Intersection of lines and curves

1. The lines $y = 4x - 11$ and $3y = 2x - 13$ intersect at the point P.
   Find the coordinates of P.

2. The lines $2x + 3y - 14 = 0$ and $3x - y - 10 = 0$ intersect at the
   point A. Find the coordinates of A.

3. The diagram shows the parabola $y = x^2 - 2x - 7$
   and the line $y = 2x - 2$.
   The line and the parabola intersect at the points M
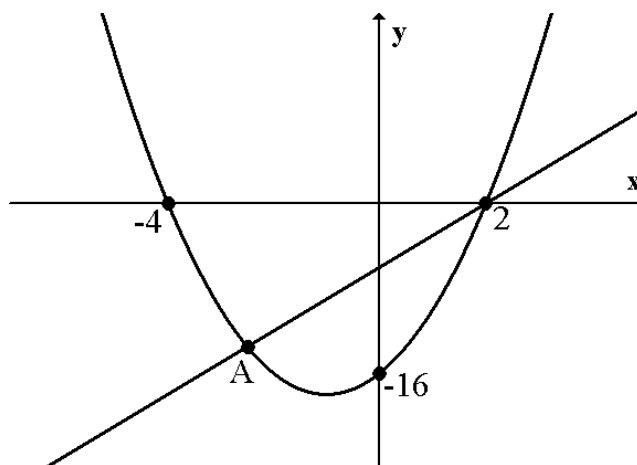   N.

   Find the coordinates of M and N.

4. The diagram shows the parabolas

   $y = 4 - x^2$ and $y = 2x^2 - 2x + 3$.

   Find the coordinates of P and Q.

5. (a) The diagram shows a parabola f(x).
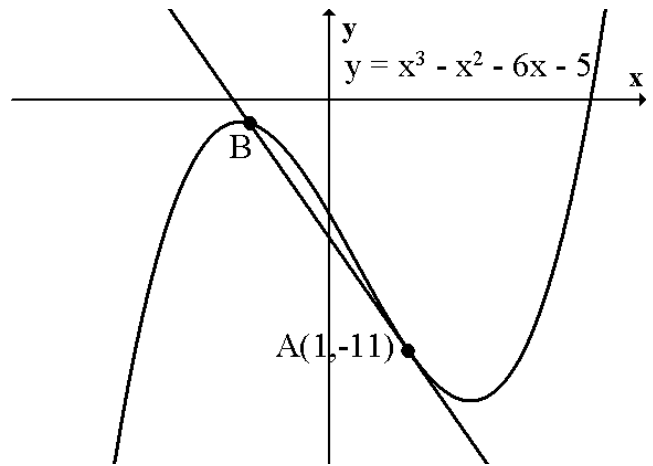
   Find a formula for f(x).

   (b) The line with equation $y = 3x - 6$ is
   also drawn on the graph.

   Find the coordinates of A.

6. The diagram shows the graph of
$y = x^3 - x^2 - 6x - 5$ and a tangent
to this curve at the point A(1,-11).

   (a) Find the equation of this tangent.
   (b) Find the coordinates of B, the point
      where the tangent meets the curve
      again.

$y = x^3 - x^2 - 6x - 5$

B

A(1,-11)

7. The line $y = 4x + 10$ and the curve $y = x^3 + 6x^2 + 3x - 20$ intersect at 3 points.
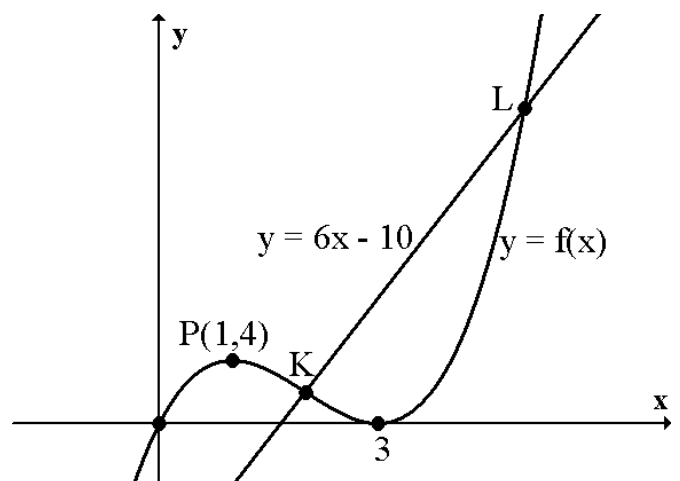   One of these points is (-3,-2). Find the coordinates of the other points.

8. The tangent to the curve $y = x^3 - 7x + 6$ at the point (-1,12) has equation $y + 4x = 8$.
   Find the coordinates of the other point of intersection of the curve and this tangent.

9. (a) The diagram shows the graph of
     $y = f(x)$.
     f(x) has a maximum turning at P(1,4)

     Find a formula for f(x).

   (b) The curve f(x) and the line $y = 6x - 10$
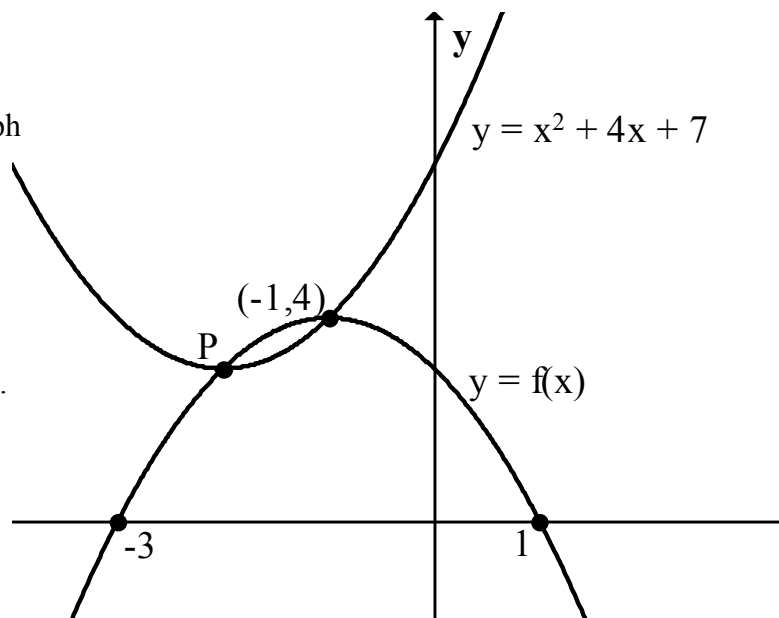   intersect at 3 points. One of these points
     is (-1,-16).

     Find the coordinates of K and L the other
     points of intersection.

L

$y = 6x - 10$

$y = f(x)$

P(1,4)

K

3

10. (a) The diagram opposite shows the graph
     of $y = f(x)$.

     Find a formula for f(x).

   (b) Find the coordinates of the point
     P, the other point of intersection of
     f(x) and the parabola $y = x^2 + 4x + 7$.

$y = x^2 + 4x + 7$

(-1,4)

P

$y = f(x)$

-3

1

11. A curve has equation $y = x^3 - 3x^2 + 2x$.

    (a) Find the equation of the tangent to this curve at the point where x = 2.

    (b) Find the coordinates of D, the point where this tangent meets the curve again.

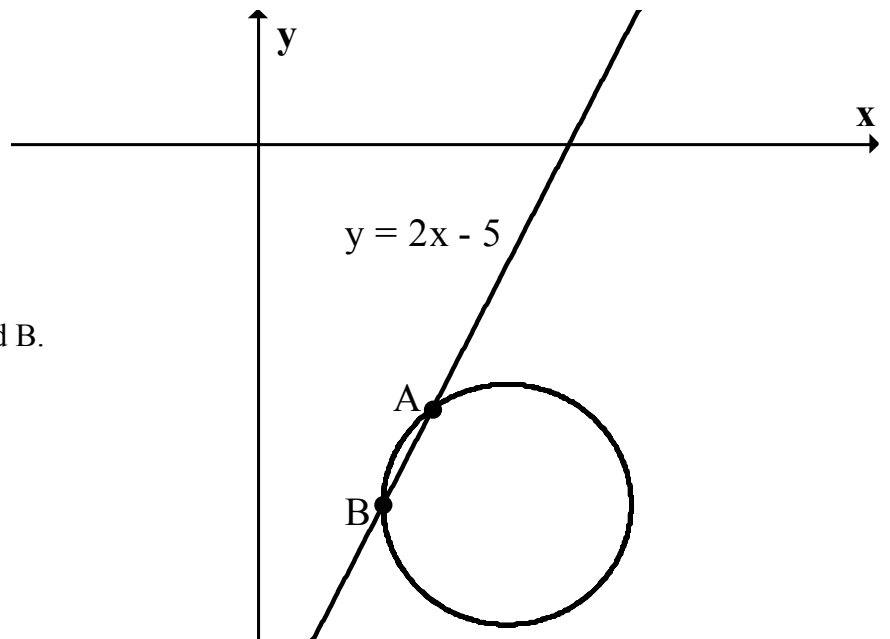12. The line y = 2x intersects the circle $x^2 + y^2 + 8x - 4y - 20 = 0$ at 2 points.

    Find the coordinates of these points.

13. The line y = 2x – 5 intersects
the circle with equation

    $x^2 + y^2 - 4x + 6y + 12 = 0$

    at 2 points, A and B.

    Find the coordinates of A and B.

14. (a) Find the equation of the tangent to the curve $y = x^3 + 2x^2 - 3x + 2$ at the
       point where x = 1.

    (b) This line is also a tangent to the circle $x^2 + y^2 - 12x - 10y + 44 = 0$.
       Find the point of contact.