

Solve the simultaneous equations  
Give your answers to 3 significant figures

$$x^2 + y^2 = 20$$

$$2x + y = 3$$

$$x^2 - 2xy - y^2 = 7$$

$$x + y = 1$$

The straight line  $l$  is a tangent to the curve  $y = x^2 - 5x + 3$  at the point  $A$  on the curve.

Given that  $l$  is parallel to the line  $3x + y = 0$ ,

- a** find the coordinates of the point  $A$ ,
- b** find the equation of the line  $l$  in the form  $y = mx + c$ .

$$y = x^3 - 4x^2 - 3x + 9$$

(a) Find  $\frac{dy}{dx}$

(b) Find the range values of  $x$  for which  $y$  is increasing

Solve each pair of simultaneous equations.

$$x - \frac{1}{y} - 4y = 0$$

$$x - 6y - 1 = 0$$

Solve the simultaneous equations

$$3^{x-1} = 9^{2y}$$

$$8^{x-2} = 4^{1+y}$$

Find  $\frac{dy}{dx}$

$$y = 3x^2 + \sqrt[3]{x}$$

$$y = \frac{4x^3 + x}{x^2}$$

$$y = \sqrt{x}(x - 4)$$

The curve with equation  $y = x^3 - 4x^2 + 3x$  crosses the  $x$ -axis at the points  $A$ ,  $B$  and  $C$ .

**a** Find the coordinates of the points  $A$ ,  $B$  and  $C$ .

**b** Find the gradient of the curve at each of the points  $A$ ,  $B$  and  $C$ .



The line  $y = 5 - x$  intersects the curve  $y = x^2 - 3x + 2$  at the points  $P$  and  $Q$ .  
Find the length  $PQ$  in the form  $k\sqrt{2}$ .

Given that

$$(A + 2\sqrt{3})(B - \sqrt{3}) \equiv 9\sqrt{3} - 1$$

find the values of the integers  $A$  and  $B$ .

A curve has the equation  $y = x^2 - 3x + 4$ .

**a** Find an equation of the normal to the curve at the point  $A (2, 2)$ .

The normal to the curve at  $A$  intersects the curve again at the point  $B$ .

**b** Find the coordinates of the point  $B$ .

$$y = \frac{(4x - 1)(x + 2)}{2x}$$

Find the equation of the normal at the point when  $x = -2$

Give your answer in the form  $ax + by + c = 0$  where  $a$ ,  $b$  and  $c$  are integers.