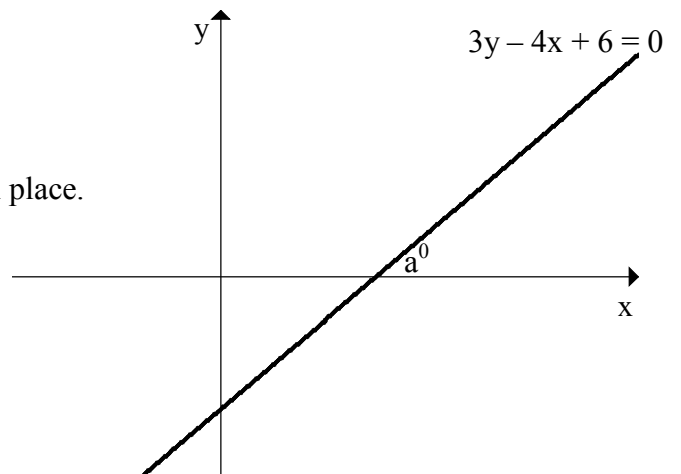


Higher Maths – Homework 5

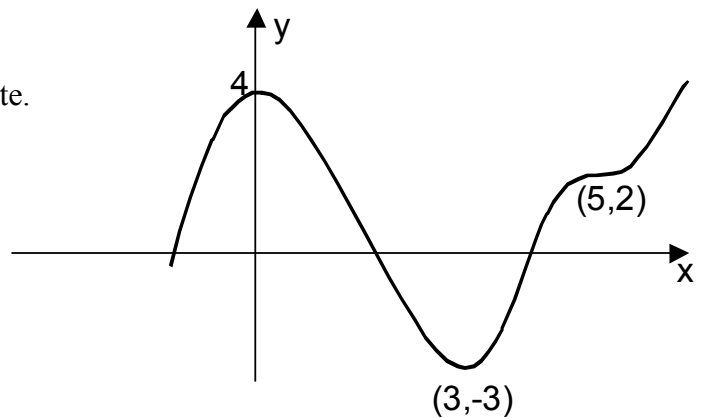
1. If $x^2 - 6x + 5$ expressed in the form $(x + a)^2 + b$ then the values of a and b are
A $a = -3, b = -4$ B $a = 3, b = -4$ C $a = -3, b = 4$ D $a = 3, b = 4$
2. A is the point $(2, -4)$ and B is the point $(-6, -4)$. The equation of the perpendicular bisector of AB is
A $x = 2$ B $x = -2$ C $y = -4$ D $y = -2$
3. What is the derivative of $\frac{2x^3 - 1}{x}$ with respect to x
A $6x - x^{-2}$ B $4x + x^{-2}$ C $4x - x^{-2}$ D $6x$
4. (a) Show that $(x - 1)$ is a factor of $f(x) = 2x^3 + 5x^2 - 11x + 4$.
(b) Hence factorise $f(x)$ completely.

5. Part of the line $3y - 4x + 6 = 0$ is shown.
Calculate the size of angle a° , to one decimal place.



6. Part of the graph of $f(x)$ is shown opposite.
The graph has stationary points at $(0, 4)$, $(3, -3)$ and $(5, 2)$.

Sketch the graph of $f'(x)$.

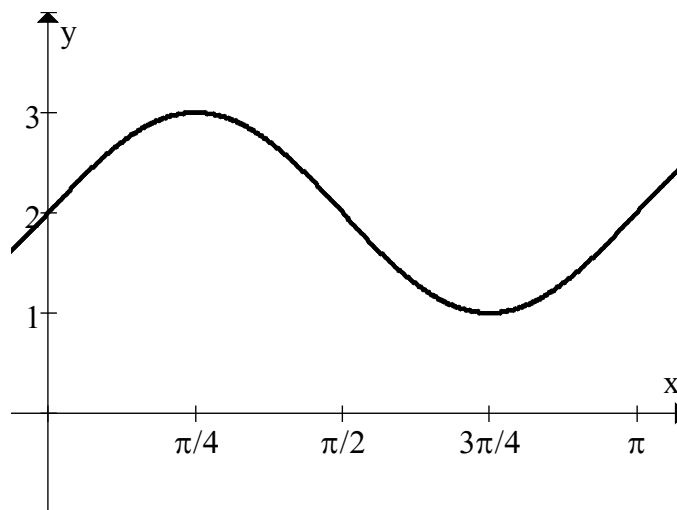


7. A triangle has vertices A(1,1), B(7,-2) and C(8,10).
 (a) Find the equation of the altitude CD.
 (b) Find the coordinates of D.
8. A recurrence relation is defined as $u_{n+1} = au_n + b$.
 (a) Given $u_1 = 24$, $u_2 = 30$ and $u_3 = 34.5$, find a and b.
 (b) Hence find the limit of this relation.
9. Find the coordinates of the point where the tangent to the curve $y = x^4 - 20x + 21$ has gradient 12.

10. $f(x) = \frac{3}{4-x}$ and $g(x) = \frac{4x+1}{x}$.

Show that $f(g(x)) = -3x$

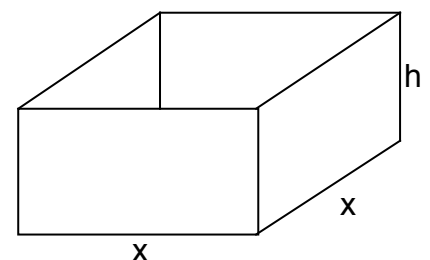
11. The diagram below shows the graph of the function $y = a + b \sin cx$ for $0 \leq x \leq \pi$.



- (a) Write down the values of a, b and c.
 (b) Find algebraically the values of x for which $y = 2.5$.
12. A large tank, in the shape of a cuboid, has volume 62.5m^3 .
 The tank has a square base of side x and is open at the top.

- (a) Express the height h, of the tank in terms of x and show that the surface area is given by

$$A = x^2 + \frac{250}{x}$$



- (b) Find x so that the surface area is minimised and hence write down the dimensions of the tank.