CfE Higher Homework (15)

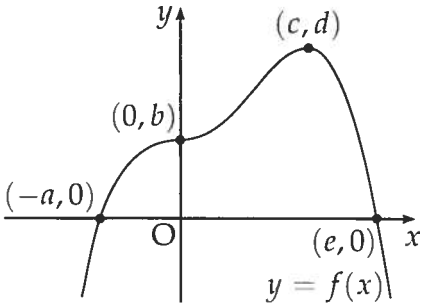
(1) Find the equation of the straight line which is parallel to the line with equation $2x + 3y = 5$ and which passes through the point $(2, -1)$.

(2) Find the exact solutions of the equation $4\sin^2 x = 1$, $0 \leq x < 2\pi$. 4

(3) The graph of a function f intersects the x-axis at $(-a, 0)$ and $(e, 0)$ as shown.

There is a point of inflexion at $(0, b)$ and a maximum turning point at (c, d).

Sketch the graph of the derived function f'. 3



(4) A curve for which $\frac{dy}{dx} = 6x^2 - 2x$ passes through the point $(-1, 2)$.

Express y in terms of x. 3

(5) Evaluate $\int_1^2 \left(x^2 + \frac{1}{x}\right)^2 dx$. 5

(6) Find the values of x for which the function $f(x) = 2x^3 - 3x^2 - 36x$ is increasing. 4

(7) (a) Show that $2\cos 2x^\circ - \cos^2 x^\circ = 1 - 3\sin^2 x^\circ$. 2

(b) Hence solve the equation $2\cos 2x^\circ - \cos^2 x^\circ = 2\sin x^\circ$ in the interval $0 \leq x < 360$. 4

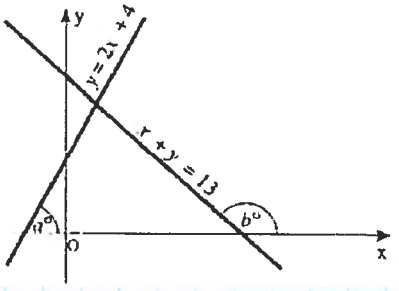
(8) The point Q divides the line joining P$(-1, -1, 0)$ to R$(5, 2, -3)$ in the ratio 2 : 1.

Find the coordinates of Q. 3

(9) The lines $y = 2x + 4$ and $x + y = 13$ make angles of a° and b° with the positive direction of the x-axis, as shown in the diagram.

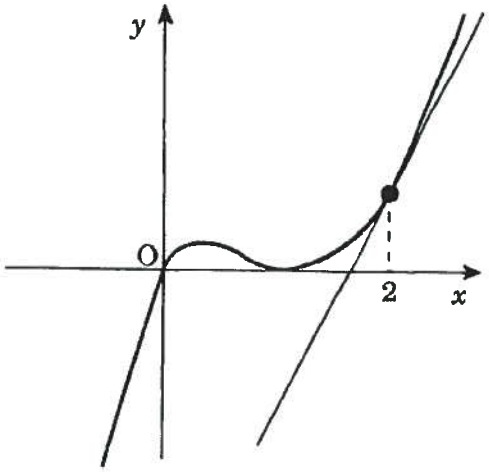
(a) Find the values of a and b.

(b) Hence find the acute angle between the two given lines.



[PTO]

10 The diagram shows a sketch of part of the graph of $y = x^3 - 2x^2 + x$.



(a) Show that the equation of the tangent to the curve at $x = 2$ is $y = 5x - 8$. **(4)**

(b) Find algebraically the coordinates of the point where this tangent meets the curve again. **(5)**