# Cfe Higher Maths Homework (5)

(1) Evaluate $\log_5 2 + \log_5 50 - \log_5 4$. 3

(2) Medical researchers studying the growth of a strain of bacteria observe that the number of bacteria, present after $t$ hours, is given by the formula $N(t) = 40e^{1.5t}$.

(a) State the number of bacteria present at the start of the experiment. 1
(b) How many minutes will the bacteria take to double in number? 4

(3) $A$ and $B$ are acute angles such that $\tan A = \frac{3}{4}$ and $\tan B = \frac{5}{12}$.

Find the exact value of

(a) $\sin 2A$ 2

(b) $\cos 2A$ 1

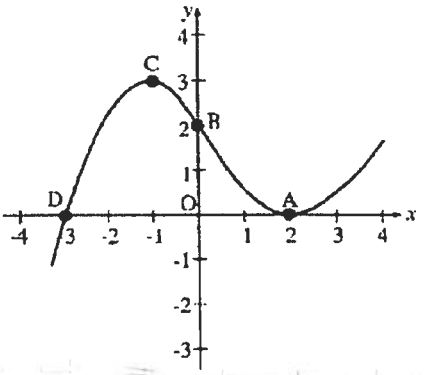
(c) $\sin(2A + B)$. 2

(4) Part of the graph of $y = f(x)$ is shown in the diagram.
On separate diagrams sketch the graphs of

(i) $y = f(x-1)$

(ii) $y = -f(x) - 2$

indicating on each graph the images of A, B, C and D. 5




(5) The vectors $p$, $q$ and $r$ are defined as follows:

$$p = 3i - 3j + 2k,\ q = 4i - j + k,\ r = 4i - 2j + 3k.$$

(a) Find $2p - q + r$ in terms of $i$, $j$ and $k$. 1

(b) Find the value of $|2p - q + r|$. 2

(6) A is the point (–3,2,4) and B is (–1,3,2). Find

(a) the components of vector $\overrightarrow{AB}$; 1
(b) the length of AB. 2

(7) The diagram shows the graph of $y = f(x)$.
Sketch the graph of $y = 2 - f(x)$.