DIFFERENTIATION & FUNCTIONS (Q 6, 7 & 8, PAPER 1)

LESSON NO. 13: CUBIC GRAPHS

2004

6 (b) Let $f(x) = x^3 - 3x^2 + 1$, $x \in \mathbf{R}$.

(i) Find $f(-1)$ and $f(3)$.

(ii) Find $f'(x)$, the derivative of $f(x)$.

(iii) Find the co-ordinates of the local maximum point and of the local minimum point of the curve $y = f(x)$.

(iv) Draw the graph of the function f in the domain $-1 \le x \le 3$.

Use your graph to:
(v) estimate the range of values of x for which $f(x) < 0$ and $x > 0$

(vi) estimate the range of values of x for which $f'(x) < 0$.

2001

6 (b) Let $f(x) = 2 - 9x + 6x^2 - x^3$ for $x \in \mathbf{R}$.

(i) Find $f(-1)$, $f(2)$ and $f(5)$.

(ii) Find $f'(x)$, the derivative of $f(x)$.

(iii) Find the co-ordinates of the local maximum and the local minimum of $f(x)$.

(iv) Draw the graph of $f(x)$ in the domain $-1 \le x \le 5$.

(v) Use your graph to find the range of real values of k for which $f(x) = k$ has more than one solution.

1996

8 (b) Let $f(x) = x^3 - 3x^2$, for $x \in \mathbf{R}$.

(i) Find $f'(x)$, the derivative of $f(x)$. Hence, calculate the coordinates of the local maximum and the local minimum of $f(x)$.

(ii) Draw the graph of
$$f(x) = x^3 - 3x^2$$
for $-1 \le x \le 3$.

ANSWERS

2004 6 (b) (i) −3, 1   (ii) $3x^2 - 6x$ (iii) (0, 1), (2, −3)
           (v) $0.7 < x < 2.7$ (vi) $0 < x < 2$

2001 6 (b) (i) 18, 0, −13   (ii) $-9 + 12x - 3x^2$ (iii) (1, −2), (3, 2)
           (v) $-2 \le k \le 2$

1996 8 (b) (i) $3x^2 - 6x$; (0,0), (2, −4)   (iii) $x = -0.7, 1, 2.7$
           (iv) $0 < x < 2$