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

## 2007



Answers			
6	(a) (i) $g'(x) = 2x - 6$	(ii) $x = 3$	
	(b) (i) 6 minutes	(ii) 5 degrees	(iii) $k = -6$
	(c) (i) $f'(x) = 20(5x-2)^3$	(ii) $(\frac{3}{5}, 1)$	

7 (a) Differentiate  $6x^4 - 3x^2 + 7x$  with respect to x. (b) (i) Differentiate  $(x^2 + 9)(4x^3 + 5)$  with respect to x. (ii) Given that  $y = \frac{3x}{2x+3}$ , find  $\frac{dy}{dx}$ . Write your answer in the form  $\frac{k}{(2x+3)^n}$ , where  $k, n \in \mathbb{N}$ . (c) A car starts from rest at the point a. (c) A car starts from rest at the poin

- (ii) Find the acceleration of the car.
- (iii) The distance from *a* to the point *b* is 24 metres. After how many seconds does the car reach the point *b*?
- 8 (a) Let  $f(x) = \frac{1}{4}(6-2x)$  for  $x \in \mathbf{R}$ . Evaluate f(5).
  - (b) Differentiate  $x^2 3x$  with respect to x from first principles.
  - (c) Let  $f(x) = \frac{1}{x+7}, x \in \mathbf{R}, x \neq -7.$

(i) Given that f(k) = 1, find k.

- (ii) Find f'(x), the derivative of f(x).
- (iii) Show that the curve y = f(x) has no turning points.

ANSWERS 7 (a)  $24x^3 - 6x + 7$ (b) (i)  $20x^4 + 108x^2 + 10x$  (ii)  $\frac{9}{(2x+3)^2}$ (c) (i)  $10 \text{ ms}^{-1}$  (ii)  $4 \text{ ms}^{-2}$  (iii) 3 s8 (a) f(5) = -1(b) 2x - 3(c) (i) k = -6 (ii)  $f'(x) = -\frac{1}{(x+7)^2}$