



SEKOLAH BUKIT SION – HIGH SCHOOL

CHAPTER TEST: DIFFERENTIATION

NAME		DATE	
CLASS		SCORE	/45

1. Find $\frac{dy}{dx}$ of the following. Express your answer in positive index, if necessary.

Choose/Answer only 2 items that will total to 5 marks.

(a) $y = -(2x + 1)^{-1/4}$ [2]

(b) $y = x^2(1 - 3x)^4$ [3]

(c) $y = \frac{5x-2}{3x^2-1}$ [3]

(d) $y = 5x^2 + \frac{7}{x} - 2\sqrt{x}$ [2]

2. Given the curve $y = -x^3 + 3x^2 - 3x$,

(a) Find the gradient of the curve at $x = 0$. [2]

(b) Write down the equation of the line tangent to the curve at $x = -1$. [3]

(c) Write down the equation of the normal line at $x = 3$. [3]

3. Find $\frac{d^2y}{dx^2}$.

(a) $y = 7x^2 + 3x - 9$ [1]

(b) $y = \frac{1}{12}x^4 - \frac{5}{6}x^3 + 3x^2 + \frac{1}{2}$ [2]

(c) $y = \frac{x^3+3}{2x^2}$ [3]

4. Given that $y = \left(2x - \frac{1}{2x^2}\right)^9$.

Show that its $\frac{dy}{dx}$ can be expressed in the form of $\left(a + \frac{b}{x^3}\right)\left(2x - \frac{1}{2x^2}\right)^8$, where a and b are integers. [3]

5. Write down the equation of the line tangent to the curve $y = (x^2 + 1)^2$ and parallel to $2y - 16x - 10 = 0$.

Hence, find also the equation of the normal at the point of tangency. [5]

6. Find the coordinates of the turning points of $y = 2x^3 - 3x^2 - 12x + 5$ and determine their nature using the first derivative test. [6]

7. Given that $(2, -34)$ and $(-3, 91)$ are stationary points of the curve $y = 2x^3 + px^2 + qx + r$.

(a) Find the value of p , of q and of r . [4]

(b) Determine the nature of each turning point using the second derivative test. [3]

8. Given that the $\frac{dy}{dx} = -6x^2 + 8x - 9$, find a possible equation of the curve if one of its tangents is $y = -7x + 1$. [5]