

NAME: _____

DATE: 09/11/2017

ASSIGNMENT: Differential Calculus and the Derivative

DIRECTIONS: In order to take the derivative, follow the formula: $f'(x) = nx^{n-1}$

For example: for $f(x) = 4x^3 - 5x^2 + 9x + 17$; $f'(x) = 12x^2 - 10x + 9$

Since the derivative measures the gradient of the tangent along different points of the original function, we can input any value of “x” to find the gradient at that point on the original function. (remember, gradient is a synonym for slope).

In our derivative $f'(x) = 12x^2 - 10x + 9$, the gradient at $x = 1$ is 11.

Minimum and maximum points on curves have tangent gradients of 0.

[Maximum mark: 6]

[SL-non calculator]

Consider $f(x) = x^2 + \frac{p}{x}$, $x \neq 0$, where p is a constant.

- (a) Find $f'(x)$. *[2 marks]*
- (b) There is a minimum value of $f(x)$ when $x = -2$. Find the value of p . *[4 marks]*

Let $g(x) = x^3 - 3x^2 - 9x + 5$. *[SL-non calculator]*

- (a) Find the two values of x at which the tangent to the graph of g is horizontal.
- (b) For each of these values, determine whether it is a maximum or a minimum.

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Please show all calculations in order to receive full marks.

1.) $f'(x) = 2x - \frac{p}{x^2}$; $p = -16$

2.) a: $x = 3$; $x = -1$; b: $x = 3$ is the minimum; $x = -1$ is the maximum

28.) Set the derivative equal to 0 to find the min and max. Part (d) is positive. Why?