

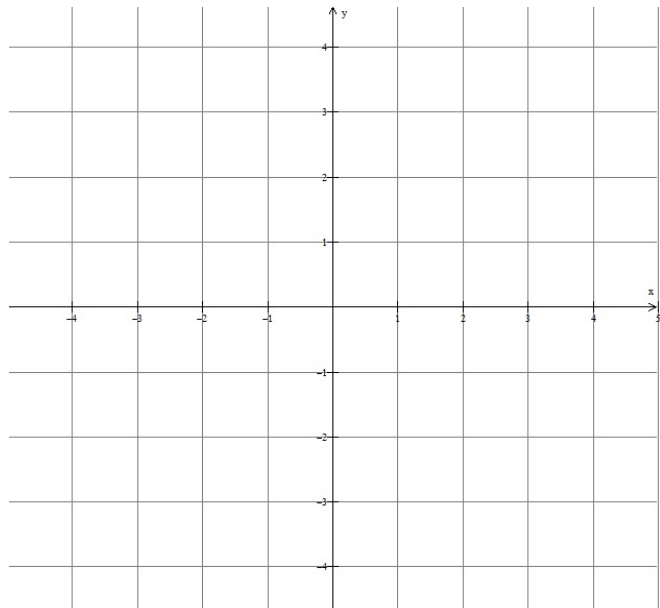
Name: _____

Date: _____

Calculus 12 LG 5-6 Quiz Ver A

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1. If $f(x) = x^2 + 1$
 - a) Find the average rate of change from $x = -2$ to $x = -1$. (2 marks)
 - b) Find the instantaneous rate of change of y with respect to x at the point $x = -2$. (2 marks)
 - c) Sketch the graph of $y = f(x)$ together with the secant and tangent lines whose slopes are given by the results of a) and b). (2 marks)



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2. Use the **definition of the derivative** to calculate $f'(x)$ if $f(x) = 3x^2 - x$ and find the equation of the tangent line to the graph of f at $x = 1$.
(3 marks)

3. Show that $f(x) = \begin{cases} x^2 - 5, & x \leq 1 \\ x - 5, & x > 1 \end{cases}$ is continuous but not differentiable at $x = 1$.
(2 marks)

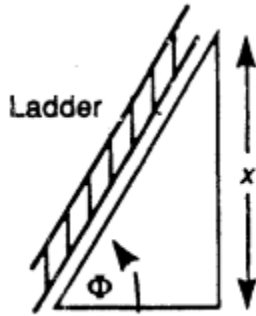
4. Find $\frac{dy}{dx}$ if $y = \frac{3x^3+5x}{2x-7}$ (2 marks)

5. Find $f''(2)$ if $f(x) = \frac{-8}{x^2} + \frac{1}{5}x^5$ (2 marks)

6. Show that the parabola $y = x^2$ and the line $x + 2y - 3 = 0$ intersect at right angles at one of their points of intersection. (3 marks)

HINT: Find the points of intersection and find their slopes.

7. A 12 foot ladder leans up against a wall at an angle θ with the horizontal as shown in the figure. The top of the ladder is x feet above the ground. If the bottom of the ladder is pushed towards the wall, find the rate at which x changes with respect to θ when $\theta = 60^\circ$. Express the answer in units of feet/degree. (3 marks)



8. Find $f'(x)$ where $f(x) = x^2(\sin 2x)^3$ (2 marks)

9. Find $\frac{dy}{dx}$ where $y = \left(\frac{x+1}{x-1}\right)^2$ (2 marks)

10. Find the equation of the tangent line to the graph of $f(x) = \sin(4 - x^2)$ at $x = 2$. (3 marks)

11. Use a local linear approximation to estimate the value of $\sqrt[4]{14}$.
(2 marks)