AP Calculus Name_____

Review Assignment 11-21

Date_____ Period____

Use the definition of the derivative to find the derivative of each function with respect to *x*.

1) $y = \sqrt{3x + 5}$

2) $y = x^2 + 1$

For each problem, determine if the Mean Value Theorem can be applied. If it can, find all values of *c* that satisfy the theorem. If it cannot, explain why not.

3) $f(x) = \dfrac{-x^2 + 9}{2x}$; $[-1, 1]$

4) $f(x) = \dfrac{-x^2 + 1}{4x}$; $[1, 5]$

5) $f(x) = \dfrac{x^2 - 1}{4x}$; $[-3, -1]$

6) $f(x) = \dfrac{-x^2 + 9}{3x}$; $[-4, -1]$

A particle moves along a horizontal line. Its position function is $s(t)$ for $t \geq 0$. For each problem, find the velocity function $v(t)$ and the acceleration function $a(t)$.

7) $s(t) = t^3 - 22t^2 + 105t$

Solve each related rate problem.

8) A hypothetical square grows so that the length of its diagonals are increasing at a rate of 5 m/min. How fast is the area of the square increasing when the diagonals are 3 m each?

9) A hypothetical square grows so that the length of its sides are increasing at a rate of 5 m/min. How fast is the area of the square increasing when the sides are 6 m each?

Answers to Review Assignment 11-21

1) $\frac{dy}{dx} = \frac{3}{2\sqrt{3x+5}}$

2) $\frac{dy}{dx} = 2x$

3) The function is not continuous on [−1, 1]

4) $\{\sqrt{5}\}$

5) $\{-\sqrt{3}\}$

6) $\{-2\}$

7) $v(t) = 3t^2 - 44t + 105$, $a(t) = 6t - 44$

8) A = area of square x = length of diagonals t = time

Equation: $A = \frac{x^2}{2}$ Given rate: $\frac{dx}{dt} = 5$ Find: $\left.\frac{dA}{dt}\right|_{x=3}$

$\left.\frac{dA}{dt}\right|_{x=3} = x \cdot \frac{dx}{dt} = 15$ m²/min

9) A = area of square s = length of sides t = time

Equation: $A = s^2$ Given rate: $\frac{ds}{dt} = 5$ Find: $\left.\frac{dA}{dt}\right|_{s=6}$

$\left.\frac{dA}{dt}\right|_{s=6} = 2s \cdot \frac{ds}{dt} = 60$ m²/min