ICM Derivatives Name_____ ID: 2

Test Review 2

Date_____ Period____

For each problem, find the equation of the line tangent to the function at the given point. Your answer should be in slope-intercept form.

1) $f(x) = x^2 - 6x + 11$ at $(1, 6)$

$y = -4x + 10$

2) $y = \frac{2}{x - 2}$ at $\left(-1, -\frac{2}{3}\right)$

$y = -\frac{2}{9}x - \frac{8}{9}$

3) $f(x) = \frac{x^2}{2} + x + \frac{5}{2}$ at $\left(-2, \frac{5}{2}\right)$

$y = -x + \frac{1}{2}$

4) $f(x) = -x^3 + 3x^2 - 2$ at $(1, 0)$

$y = 3x - 3$

Differentiate each function with respect to *x*.

5) $f(x) = -5x^3(4x^2 + 2)$

$f'(x) = -5x^3 \cdot 8x + (4x^2 + 2) \cdot -15x^2$

6) $y = (3x^5 + 5x^3 + 2)(x^2 - 1)$

$\frac{dy}{dx} = (3x^5 + 5x^3 + 2) \cdot 2x + (x^2 - 1)(15x^4 + 15x^2)$

7) $f(x) = (-5x^2 - 4) \cdot \frac{\cos x}{3}$

$f'(x) = (-5x^2 - 4) \cdot -1 \cdot \frac{\sin x}{3} + \frac{\cos x}{3} \cdot -10x$

8) $f(x) = (-x^5 - 2x - 1) \cdot 5\csc x$

$f'(x) = (-x^5 - 2x - 1) \cdot -5\csc x \cdot \cot x + 5\csc x \cdot (-5x^4 - 2)$

9) $f(x) = \frac{4x^3 - 2}{2x^4 - 5}$

$f'(x) = \frac{(2x^4 - 5) \cdot 12x^2 - (4x^3 - 2) \cdot 8x^3}{(2x^4 - 5)^2}$

10) $y = \frac{x^5 - 2x^4}{5x^5 - 3}$

$\frac{dy}{dx} = \frac{(5x^5 - 3)(5x^4 - 8x^3) - (x^5 - 2x^4) \cdot 25x^4}{(5x^5 - 3)^2}$

11) $f(x) = \dfrac{5x^4 + 2}{4\cot x}$

$f'(x) = \dfrac{4\cot x \cdot 20x^3 - (5x^4 + 2) \cdot (-4\csc x)^2}{(4\cot x)^2}$

12) $f(x) = \dfrac{-2x^5 + 5}{\sec x}$

$f'(x) = \dfrac{\sec x \cdot -10x^4 - (-2x^5 + 5)\sec x \cdot \tan x}{\sec^2 x}$

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 $a(t)$.

13) $s(t) = t^4 - 15t^3$

$v(t) = 4t^3 - 45t^2$, $a(t) = 12t^2 - 90t$

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

14) $s(t) = t^2 - 3t - 40$

$v(t) = 2t - 3$, $a(t) = 2$

Changes direction at: $t = \left\{\dfrac{3}{2}\right\}$

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 $a(t)$. Then determine the average velocity from t=1 to t=4 seconds.

15) $s(t) = t^4 - 8t^3$

$v(t) = 4t^3 - 24t^2$, $a(t) = 12t^2 - 48t$, -36 ft/s

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 $a(t)$. Then determine the instantaneous acceleration at t=5 seconds.

16) $s(t) = t^4 - 11t^3$

$v(t) = 4t^3 - 33t^2$, $a(t) = 12t^2 - 66t$, $-30\ \dfrac{ft}{s^2}$

