AP Calculus AB Name_____

Review for Test

Date_____ Period____

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

1) $y = -3x^2 + 2$

Differentiate each function with respect to *x*.

2) $y = \sqrt[4]{3x^5 - 5}$

3) $y = (-2x^2 - 3)^3$

4) $y = (x^3 - 4)^5$

5) $y = \sqrt[3]{-x - 2}$

6) $y = (-2x^5 - 1)(-3x^4 + 2)^2$

7) $y = \left(\frac{-x^2 + 2}{-2x^5 + 3}\right)^2$

8) $y = -\sqrt[3]{x^2}$

9) $y = -2\sqrt[5]{x}$

10) $y = -x^2$

11) $y = -4x^5$

12) $y = \left(-5x^{\frac{3}{5}} - 2\right)(3x^4 - 5)$

13) $y = \left(-4 - 5x^{-3}\right)(-2x^3 - 1)$

14) $y = \dfrac{x^4 - 5}{x^5 - 3}$

15) $y = \dfrac{3x^3 - 2x^2 - 4}{3x^5 - 2}$

For each problem, find the points where the tangent line to the function is horizontal.

16) $y = \dfrac{x^2}{3x + 3}$

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.

17) $y = \dfrac{x^2}{2x - 4}$ at $\left(3, \dfrac{9}{2}\right)$

For each problem, find the equation of the line normal to the function at the given point. If the normal line is a vertical line, indicate so. Otherwise, your answer should be in slope-intecept form.

18) $y = x^2 - 4x - 2$ at $(0, -2)$

Answers to Review for Test

1) $\frac{dy}{dx} = -6x$

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

$= \frac{15x^4}{4(3x^5 - 5)^{\frac{3}{4}}}$

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

$= -12x(-2x^2 - 3)^2$

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

$= 15x^2(x^3 - 4)^4$

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

$= -\frac{1}{3(-x - 2)^{\frac{2}{3}}}$

6) $\frac{dy}{dx} = (-2x^5 - 1) \cdot 2(-3x^4 + 2) \cdot -12x^3 + (-3x^4 + 2)^2 \cdot -10x^4$

$= 2x^3(-3x^4 + 2)(39x^5 + 12 - 10x)$

7) $\frac{dy}{dx} = 2 \cdot \frac{-x^2 + 2}{-2x^5 + 3} \cdot \frac{(-2x^5 + 3) \cdot -2x - (-x^2 + 2) \cdot -10x^4}{(-2x^5 + 3)^2}$

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

8) $\frac{dy}{dx} = -\frac{2}{3x^{\frac{1}{3}}}$

9) $\frac{dy}{dx} = -\frac{2}{5x^{\frac{4}{5}}}$

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

11) $\frac{dy}{dx} = -20x^4$

12) $\frac{dy}{dx} = \left(-5x^{\frac{3}{5}} - 2\right) \cdot 12x^3 + (3x^4 - 5) \cdot -3x^{-\frac{2}{5}}$

$= -69x^{\frac{18}{5}} - 24x^3 + \frac{15}{x^{\frac{2}{5}}}$

13) $\frac{dy}{dx} = (-4 - 5x^{-3}) \cdot -6x^2 + (-2x^3 - 1) \cdot 15x^{-4}$

$= 24x^2 - \frac{15}{x^4}$

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

$= \frac{-x^8 + 25x^4 - 12x^3}{x^{10} - 6x^5 + 9}$

15) $\frac{dy}{dx} = \frac{(3x^5 - 2)(9x^2 - 4x) - (3x^3 - 2x^2 - 4) \cdot 15x^4}{(3x^5 - 2)^2}$

$= \frac{-18x^7 + 18x^6 + 60x^4 - 18x^2 + 8x}{9x^{10} - 12x^5 + 4}$

16) $\left(-2, -\frac{4}{3}\right), (0, 0)$

17) $y = -\frac{3}{2}x + 9$

18) $y = \frac{1}{4}x - 2$