Calculus Name_____ ID: 1

Equations of Tangent Lines

Date_____ Period____

For each problem, find the slope of the function at the given value.

1) $y = x^3 - 10x^2 + 33x - 34$ at $x = 3$

$y' = 3x^2 - 20x + 33$ at $x=3$

$= 27 - 60 + 33 = \boxed{0}$

2) $y = \frac{1}{x-1}$ at $x = 0$

$u=1 \quad v=(x-1) \quad v' = \frac{0-1}{(x-1)^2} = -\frac{1}{(x-1)^2}$

$u'=0 \quad v' = 1$

$\boxed{m=-1}$

3) $y = -\frac{1}{x^2+1}$ at $x = -3$

$u=-1 \quad v = x^2+1$

$u'=0 \quad v' = 2x$

$y' = \frac{0-(-1)(2x)}{(x^2+1)^2} = \frac{2x}{(x^2+1)^2}$

$\frac{-6}{100} = \boxed{\frac{-3}{50}}$

4) $y = -2x^2 - 16x - 33$ at $x = -3$

$y' = -4x - 16$

$y'(-3) = -4(-3) - 16$

$= 12 - 16 = \boxed{-4}$

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.

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

$u=-2 \quad v = x-1$

$u'=0 \quad v'=1$

$y' = \frac{+2}{(x-1)^2}$

$y - \frac{1}{2} = \frac{1}{8}(x+3)$

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

$y' = -3x^2 + 6x$

$y'(-1) = -3 - 6 = -9$

$y + 2 = -9(x+1)$

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

$u=2 \quad v = x^2-4$

$u'=0 \quad v' = 2x$

$y' = \frac{-4x}{(x^2-4)^2} \quad \frac{12}{25}$

$y - \frac{2}{5} = \frac{12}{25}(x+3)$

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

$u=-2 \quad v = x-3$

$u'=0 \quad v'=1$

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

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

9) $y = x^2 - 2x - 4$ at $(1, -5)$

$y' = 2x - 2$

$y + 5 = 0(x-1) \quad y = -5$

10) $y = -x^3 - 14x^2 - 60x - 75$ at $(-3, 6)$

$y' = -3x^2 - 28x - 60$

$y' = -3(-3)^2 - 28(-3) - 60$

$y - 6 = -3(x+3)$

11) $y = -2x^2 - 8x - 10$ at $(-2, -2)$

$y' = -4x - 8$

$y'(-2) = 0$

$y + 2 = 0 \quad y = -2$

12) ~~$y = (2x+2)^2$ at $(3, 4)$~~

13) $y = -\frac{9x}{x^2+9}$ at $\left(-2, \frac{18}{13}\right)$

$u = -9x \quad v = x^2+9$

$u' = -9 \quad v' = 2x$

$y' = \frac{-9x^2 + 81 + 18x^2}{(x^2+9)^2}$

$y - \frac{18}{13} = \frac{-45}{169}(x+2)$

14) $y = -2x^2 + 16x - 26$ at $(3, 4)$

$y' = -4x + 16$

$y' = -12 + 16 = 4$

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

15) $y = \frac{x^2}{4x-4}$ at $\left(3, \frac{9}{8}\right)$

$u = x^2 \quad v = 4x-4$

$u' = 2x \quad v' = 4$

$y' = \frac{2x(4x-4) - 4x^2}{(4x-4)^2}$

$y' = \frac{8x^2 - 8x - 4x^2}{(4x-4)^2}$

$y' = \frac{4x^2 - 8x}{(4x-4)^2}$

$y - \frac{9}{8} = \frac{3}{16}(x-3)$