

## Calculus Worksheet #1 Unit 2 Selected Solutions

Find the equation of (a) the line that is tangent to and (b) the line that is normal to each of the following functions at the point on the graph with the given x-coordinate. If any line is oblique give its slope-intercept equation. Show your work and your solutions neatly organized.

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

$$y = f(3) = 2 \quad f'(x) = 2x - 3$$

$$\text{point } (3, 2) \quad m_t = f'(3) = 3$$

(a) tangent line:  $y = 3x - 7$

$$\text{tangent line: } y - y_1 = m_t(x - x_1)$$

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

$$y - 2 = 3x - 9$$

$$\text{tangent line: } y = 3x - 7$$

(b) normal line:  $y = (-1/3)x + 3$

normal line:

$$\text{point } (3, 2) \quad m_n = -1/m_t$$

$$m_n = -1/3$$

$$y - y_1 = m_n(x - x_1)$$

$$y - 2 = (-1/3)(x - 3)$$

$$y - 2 = (-1/3)x + 1$$

$$\text{normal line: } y = (-1/3)x + 3$$

7.  $f(x) = \sqrt{x}$  ;  $x = 9$

$$y = f(x) = x^{0.5}$$

$$f'(x) = 0.5x^{-0.5}$$

$$y = f(9) = 3$$

$$m_t = f'(9) = (1/2)(9^{-0.5})$$

$$\text{point } (9, 3)$$

$$m_t = f'(9) = (1/2)(1/3) = 1/6$$

$$\text{tangent line: } y - y_1 = m_t(x - x_1)$$

$$y - 3 = (1/6)(x - 9)$$

$$y - 3 = (1/6)x - 3/2$$

(a) tangent line:  $y = (1/6)x + 3/2$

$$\text{tangent line: } y = (1/6)x + 3/2$$

(b) normal line:  $y = -6x + 57$

normal line:

$$\text{point } (9, 3) \quad m_n = -1/m_t$$

$$m_n = -6$$

$$y - y_1 = m_n(x - x_1)$$

$$y - 3 = -6(x - 9)$$

$$y - 3 = -6x + 54$$

$$\text{normal line: } y = -6x + 57$$

