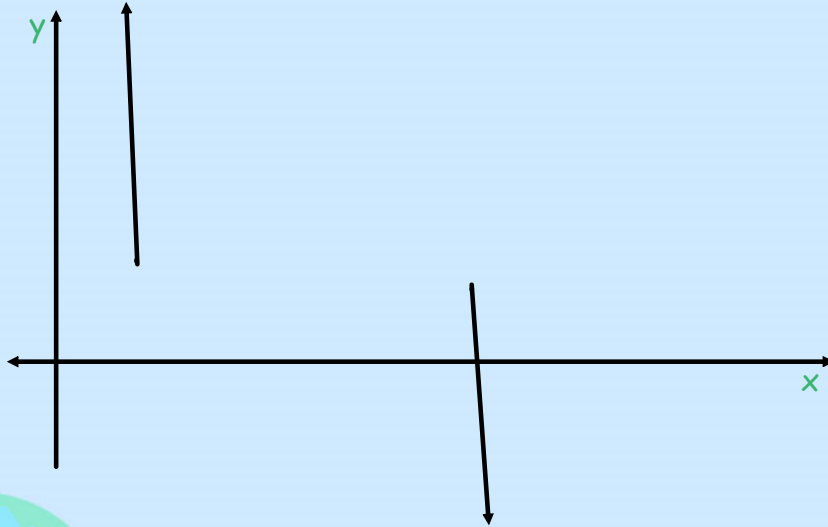
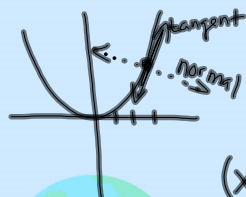


# Tangent Lines and Normal Lines



Jan 5-11:36 AM

Let's try it... Find the equation of the tangent line and the normal line to the curve  $f(x) = x^2$  when  $x=3$ .



$$f'(x) = 2x$$

$$f'(3) = 2(3) = 6$$

tangent  $m = 6$   
 normal  $m = -\frac{1}{6}$

$$f(3) = 3^2 = 9$$

$(x, y)$   
 $(3, 9)$

tangent line:  $y - 9 = 6(x - 3)$

normal line:  $y - 9 = -\frac{1}{6}(x - 3)$

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

$$\frac{y - y_1}{x - x_1} = m$$

$$y = mx + b$$

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tangent line:

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

$$x = 3,$$

$$y' = 3(3)^2 - 6(3)$$

$$= 27 - 18$$

$$= 9$$

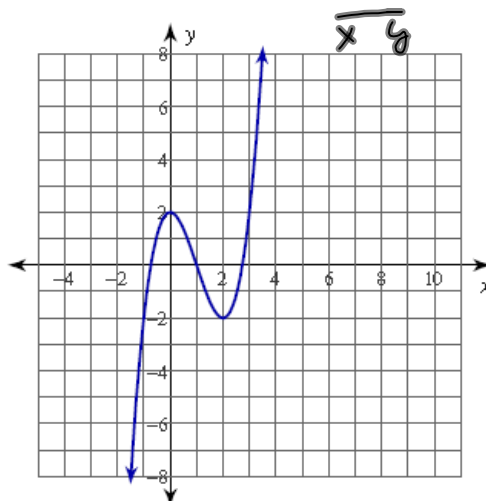


normal

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

$$y - 2 = -\frac{1}{9}(x - 3)$$

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



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

$$y' = 3x^2 - 4x$$

$$x = 2, \quad y' = 3(2)^2 - 4(2)$$

$$= 12 - 8$$

$$= 4$$

$$y - 2 = 4(x - 2)$$

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



Jan 8-12:27 PM