

Today's Plan:

Learning Target (standard): I will determine the equations for tangent and normal lines.

Students will: Complete practice problems over previous concepts at the boards, put up homework problems on the board and make necessary corrections to their own work, take notes over new material and complete practice problems over new concepts.

Teacher will: Provide practice problems over previous concepts, check homework problems for accuracy and provide students feedback, describe and provide examples of new concepts and assign students assessment problems over new concepts.

Assessment: Board work, homework check and homework assignment

Differentiation: Students will work at the board, go over and correct homework at their seats, actively engage in lecture over new concepts, practice new concepts with the aid of other students and the teacher and complete homework assignment.

• Wkst 75 #3,4,5,8,9,11,13,14

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

$$x + y = 6$$

$$4) y = -\frac{3}{64}x + \frac{25}{64}$$

$$3x + 64y = 25$$

$$5) y = \frac{1}{6}x + \frac{19}{3}$$

$$x - 6y = -38$$

$$8) y = -39x + 166$$

$$39x + y = 166$$

$$9) y = \frac{24}{7}x - \frac{47}{7}$$

$$24x - 7y = 47$$

$$11) x = -\frac{\sqrt{6}}{2}, \frac{\sqrt{6}}{2}$$

$$13) x = 9$$

$$14) \left(-\frac{3}{2}, \frac{41}{4} \right)$$

$$y = 2x^3 - 8x$$

$$y' = 6x^2 - 8$$

→ slope of tangent

$$y = x$$

$$m = 1$$

$$6x^2 - 8 = 1$$

$$6x^2 = 9$$

$$\sqrt{x^2} = \pm \frac{3}{2}$$

$$x = \frac{\sqrt{6}}{2}, -\frac{\sqrt{6}}{2}$$

$$14) y = 8 - 3x - x^2 \quad // \quad x\text{-axis}$$

$$m = 0$$

$$m_{\text{tan}} = -2x - 3$$

$$-2x - 3 = 0$$

$$y = 8 - 3\left(-\frac{3}{2}\right) - \left(-\frac{3}{2}\right)^2 \quad -2x = 3$$

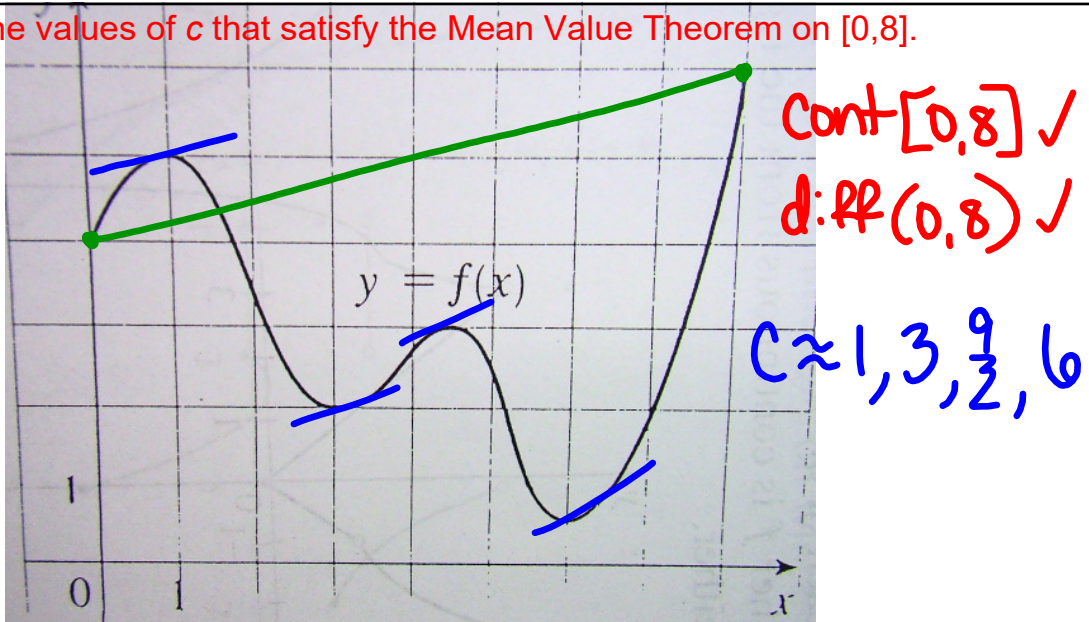
$$y = 8 + \frac{9}{2} - \frac{9}{4}$$

$$= \frac{32 + 18 - 9}{4}$$

$$x = -\frac{3}{2}$$

$$\left(-\frac{3}{2}, \frac{41}{4}\right)$$

Find the values of c that satisfy the Mean Value Theorem on $[0,8]$.



Determine whether the function satisfies the hypothesis of the MVT and if so, find c that satisfies the conclusion.

$$f(x) = x^3 - 2x^2 + x + 3 \quad \text{Cont } [-1,1] \checkmark$$

$$[-1,1] \quad f'(x) = 3x^2 - 4x + 1 \quad \text{d: ff } (-1,1) \checkmark$$

$$f(1) - f(-1) = (1+1)(3c^2 - 4c + 1)$$

$$3 + 1 = 2(3c^2 - 4c + 1)$$

$$4 = 2(3c^2 - 4c + 1)$$

$$2 = 3c^2 - 4c + 1$$

$$0 = 3c^2 - 4c - 1$$

$$C = \frac{2+\sqrt{7}}{3}, \frac{2-\sqrt{7}}{3}$$

$$C = \frac{2-\sqrt{7}}{3}$$

$$C = \frac{4 \pm \sqrt{16 - 4(3)(-1)}}{2(3)}$$

$$= \frac{4 \pm \sqrt{16+12}}{6}$$

$$= \frac{4 \pm \sqrt{28}}{6} = \frac{4 \pm 2\sqrt{7}}{6}$$

Determine whether the function satisfies the hypothesis of the MVT and if so, find c that satisfies the conclusion.

$$f(x) = x^{\frac{2}{3}} - x^{\frac{1}{3}} \quad \text{cont } [0,1] \checkmark \quad \text{Rolle's Theorem}$$

$[0,1]$

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

$$f'(x) = \frac{2}{3x^{\frac{1}{3}}} - \frac{1}{3x^{\frac{2}{3}}} \quad \text{d:ff}(0,1) \checkmark$$

$$f(1) - f(0) = (1-0) \left(\frac{2}{3}1^{-\frac{1}{3}} - \frac{1}{3}1^{-\frac{2}{3}} \right)$$

$$0 = \frac{2}{3}c^{-\frac{1}{3}} - \frac{1}{3}c^{-\frac{2}{3}}$$

$$0 = \frac{2}{3c^{\frac{1}{3}}} - \frac{1}{3c^{\frac{2}{3}}}$$

$$0 = \frac{1}{3}c^{-\frac{2}{3}} (2c^{\frac{1}{3}} - 1)$$

$$0 = \frac{2c^{\frac{1}{3}} - 1}{3c^{\frac{2}{3}}}$$

$$0 = \frac{2c^{\frac{1}{3}} - 1}{3c^{\frac{2}{3}}}$$

$$2c^{\frac{1}{3}} - 1 = 0$$

$$2c^{\frac{1}{3}} = 1$$

$$\left(c^{\frac{1}{3}}\right)^3 = \left(\frac{1}{2}\right)^3$$

$$c = \frac{1}{8}$$

Find the equation of the tangent line and the normal to the curve through the given point.

$$f(x) = x^3 + x^2$$

$$f'(x) = 3x^2 + 2x$$

$$(3, 36) \quad x=3$$

$$m_{\text{tan}(3,36)} = 3(3)^2 + 2(3)$$

$$y = mx + b$$

$$m_{\text{tan}(3,36)} = 27 + 6 = 33$$

$$36 = 33(3) + b$$

$$y = 33x - 63$$

$$36 = 99 + b$$

tangent line:

$$b = -63$$

$$33x - y = 63$$

$$m_{\text{normal}(3,36)} = -\frac{1}{33}$$

$$y = mx + b$$

$$36 = -\frac{1}{33}(3) + b$$

$$36 = -\frac{1}{11} + b$$

$$\left[y = -\frac{1}{33}x + \frac{397}{11} \right]_{33}$$

$$b = \frac{397}{11}$$

$$33y = -x + 1191$$

$$y = -\frac{1}{33}x + \frac{397}{11}$$

$$x + 33y = 1191$$

normal line

Find the equation of the tangent line to the curve through the given point.

$$f(x) = \frac{2x+5}{x^2-3} \quad f(1) = \frac{2(1)+5}{(1)^2-3} \quad f'(x) = \frac{2(x^2-3) - 2x(2x+5)}{(x^2-3)^2}$$

$$@ x=1 \quad (1, -\frac{7}{2}) \quad f(1) = -\frac{7}{2} \quad = \frac{2x^2 - 6 - 4x^2 - 10x}{(x^2-3)^2}$$

$$m_{\tan(1, -\frac{7}{2})} = \frac{-2(1)^2 - 10(1) - 6}{(1-3)^2} \quad f'(x) = \frac{-2x^2 - 10x - 6}{(x^2-3)^2}$$

$$= \frac{-2 - 10 - 6}{4}$$

$$y = mx + b$$

$$m_{\tan(1, -\frac{7}{2})} = -\frac{9}{2}$$

$$-\frac{7}{2} = -\frac{9}{2}(1) + b$$

$$-\frac{7}{2} + \frac{9}{2} = b$$

$$2 \left[y = -\frac{9}{2}x + 1 \right]$$

$$b = 1$$

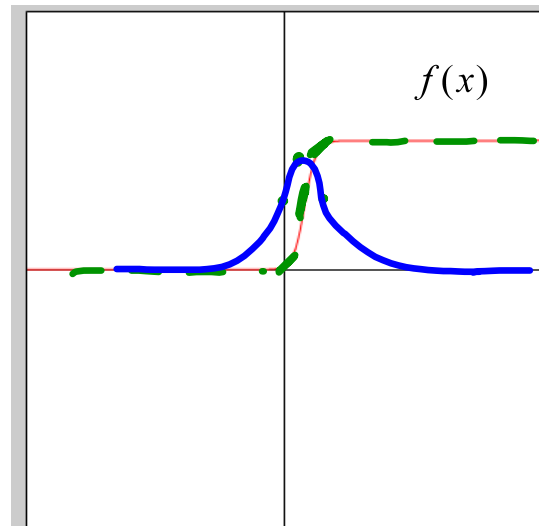
$$2y = -9x + 2$$

$$y = -\frac{9}{2}x + 1$$

$$\boxed{9x + 2y = 2}$$

tangent line

Sketch the graph of the derivative of the function.



Assignment:

Continuity & MVT Worksheet

#1-10

* Quiz tomorrow *