Rate of Change Practice

Name: _____   Date: _____

Question 1

Estimate the rate of change

I. $x = 2$

II. $x = 1$

Question 2

Find the average rate of change

I. $f(x) = \sqrt{4x + 1}$

  $[0, 2]$

II. $f(x) = x^3 - 4x^2 + 5x$

  $[1, 2]$

Rate of Change Practice

Question 3

Determine the slope of the curve and the equation of the tangent line at the point

I.   (-2 , -0.5)   y = 1 / x

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Question 1

Estimate the rate of change

I. x = 2

Point

(0 , 10) $\dfrac{10 - 74}{0 - 2}$ = 32

(0.5 , 38) $\dfrac{38 - 74}{0.5 - 2}$ = 24   approaching 0

(1 , 58) $\dfrac{58 - 74}{1 - 2}$ = 16

(1.5 , 70) $\dfrac{70 - 74}{1.5 - 2}$ = 8

(2 , 74) $\dfrac{8 + \text{-}8}{2}$ = 0

(2.5 , 70) $\dfrac{70 - 74}{2.5 - 2}$ = -8

(3 , 58) $\dfrac{58 - 74}{3 - 2}$ = -16   approaching 0

(3.5 , 38) $\dfrac{38 - 74}{3.5 - 2}$ = -24

(4 , 10) $\dfrac{10 - 74}{4 - 2}$ = -32

II. x = 1

Point

(0 , 0) $\dfrac{0 - 3}{0 - 1}$ = 3

(0.2 , 0.12) $\dfrac{0.12 - 3}{0.2 - 1}$ = 3.6   approaching 6

(0.4 , 0.48) $\dfrac{0.48 - 3}{0.4 - 1}$ = 4.2

(0.6 , 1.08) $\dfrac{1.08 - 3}{0.6 - 1}$ = 4.8

(0.8 , 1.92) $\dfrac{1.92 - 3}{0.8 - 1}$ = 5.4 $\dfrac{5.4 + 6.6}{2}$ = 6

(1 , 3)

(1.2 , 4.32) $\dfrac{4.32 - 3}{1.2 - 1}$ = 6.6   approaching 6

(1.4 , 5.88) $\dfrac{5.88 - 3}{1.4 - 1}$ = 7.2

Question 2

Find the average rate of change

I. f(x) = $\sqrt{4x + 1}$

   [0 , 2]

   $\dfrac{\left(\sqrt{4(2) + 1}\right) - \left(\sqrt{4(0) + 1}\right)}{2 - 0}$ = 1

II. f(x) = $x^3 - 4x^2 + 5x$

   [1 , 2]

   $\dfrac{((2)^3 - 4(2)^2 + 5(2)) - ((1)^3 - 4(1)^2 + 5(1))}{2 - 1}$ = 0

Rate of Change Practice

Question 3

Determine the slope of the curve and the equation of the tangent line at the point

I. (-2 , -0.5) $y = 1 / x$

$$\frac{\dfrac{1}{-2+h} - \dfrac{1}{-2}}{h} \longrightarrow \frac{\dfrac{1}{-2+h} + \dfrac{1}{2}}{h} \longrightarrow \frac{\dfrac{2}{-4+2h} + \dfrac{-2+h}{-4+2h}}{h}$$

$$\downarrow$$

$$\frac{2+(-2+h)}{2(-2+h)} \cdot \frac{1}{h} \longleftarrow \frac{\dfrac{2+(-2+h)}{2(-2+h)}}{h} \longleftarrow \frac{\dfrac{2+-2+h}{-4+2h}}{h}$$

$$\downarrow$$

$$\frac{\cancel{h}}{2(-2+h)} \cdot \frac{1}{\cancel{h}} \longrightarrow \frac{1}{2(-2+h)}$$

As h approaches 0

$$\frac{1}{2(-2+h)}$$ approaches -1 / 4 OR -0.25

Slope of the Curve at (-2 , -0.5)

$$y - (-0.5) = -0.25(x - (-2)) \longrightarrow y + 0.5 = -0.25(x + 2) \longrightarrow y + 0.5 = -0.25x + -0.5$$

$$\downarrow$$

$$y = -0.25x - 1 \longleftarrow y = -0.25x + -1$$

Equation of the Tangent Line at (-2 , -0.5)