

49).

Δy

$$f = 3(2)^2 - 5(2) + 1 = 3$$

$$f = 3(2.5)^2 - 5(2.5) + 1 = 7.25$$

$$7.25 - 3 = 4.25$$

Δx

$$2.5 - 2 = 0.5$$

Slope of secant = $\frac{\Delta y}{\Delta x}$

$$\frac{\Delta y}{\Delta x} = \frac{4.25}{0.5} = 8.5$$

$$f = 3(2)^2 - 5(2) + 1 = 3$$

$$f = 3(2.1)^2 - 5(2.1) + 1 = 3.73$$

$$3.73 - 3 = 0.73$$

$$2.1 - 2 = 0.1$$

$$\frac{\Delta y}{\Delta x} = \frac{0.73}{0.1} = 7.3$$

$$f = 3(2)^2 - 5(2) + 1 = 3$$

$$f = 3(2.01)^2 - 5(2.01) + 1 = 3.07$$

$$3.07 - 3 = 0.07$$

$$2.01 - 2 = 0.01$$

$$\frac{\Delta y}{\Delta x} = \frac{0.07}{0.01} = 7.0$$

$$f = 3(2)^2 - 5(2) + 1 = 3$$

$$f = 3(2.001)^2 - 5(2.001) + 1 = 3.01$$

$$3.01 - 3 = 0.01$$

$$2.001 - 2 = 0.001$$

$$\frac{\Delta y}{\Delta x} = \frac{0.01}{0.001} = 10.0$$

4b).

 Δy Δx

Slope of secant =

$$f = \sqrt{2+2} = 2$$

$$2.5 - 2 = 0.5$$

$$\frac{\Delta y}{\Delta x} = \frac{0.12}{0.5} = 0.24$$

$$f = \sqrt{2.5+2} = 2.12$$

$$2 - 2.12 = -0.12$$

$$\frac{\Delta y}{\Delta x} = \frac{0.02}{0.1} = 0.2$$

$$f = \sqrt{2+2} = 2$$

$$2.1 - 2 = 0.1$$

$$\frac{\Delta y}{\Delta x} = \frac{0}{0.01} = 0$$

$$f = \sqrt{2.1+2} = 2.02$$

$$2 - 2.02 = -0.02$$

$$2.01 - 2 = 0.01$$

$$f = \sqrt{2+2} = 2$$

$$f = \sqrt{2.01+2} = 2.00$$

$$2 - 2.00 = 0$$

$$\frac{\Delta y}{\Delta x} = \frac{0.59}{0.001} = 590$$

$$f = \sqrt{2+2} = 2$$

$$2.001 - 2 = 0.001$$

$$f = \sqrt{2.001+2} = 1.41$$

$$1.41 - 2.00 = -0.59$$

Instantaneous Rate of Change

1) a). $(5, 3)$

b). $(3, 7)$

c).
$$\frac{y_2 - y_1}{x_2 - x_1}$$
$$\begin{matrix} x_1 & y_1 & x_2 & y_2 \\ (5, 3) & & (3, 7) & \end{matrix}$$

$$= \frac{7-3}{3-5}$$

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

$$= -2$$

$$\begin{matrix} x_1 & y_1 & x_2 & y_2 \\ (5, 3) & & (3, 7) & \end{matrix}$$

$$\frac{7-3}{3-5}$$

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

$$= -2$$

d). The slope at the tangent line represents an instantaneous rate of change at $x=5$.

2) a) At Point A the instantaneous rate of change is positive.

At Point B the instantaneous rate of change is 0.

At Point C the instantaneous rate of change is negative.

b). The instantaneous rate of change at point A is

$m = 4 \text{ m/s}$. The roc at point C is $m = -6 \text{ m/s}$.

c). It shows a velocity at 2 seconds and 7 seconds.

$$3 a). \frac{dy}{dx} = 7$$

$$b). \frac{dy}{dx} = 0.25$$

4).