

Assignment #2.1a

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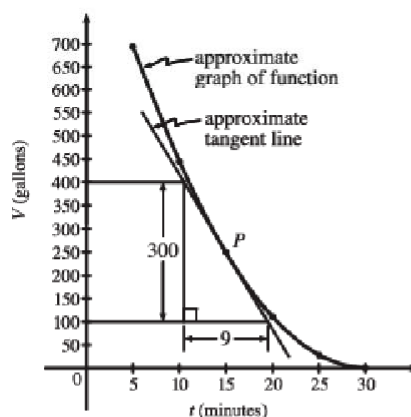
1. (a) Using $P(15, 250)$, we construct the following table:

t	Q	slope = m_{PQ}
5	(5, 694)	$\frac{694-250}{5-15} = -\frac{444}{10} = -44.4$
10	(10, 444)	$\frac{444-250}{10-15} = -\frac{194}{5} = -38.8$
20	(20, 111)	$\frac{111-250}{20-15} = -\frac{139}{5} = -27.8$
25	(25, 28)	$\frac{28-250}{25-15} = -\frac{222}{10} = -22.2$
30	(30, 0)	$\frac{0-250}{30-15} = -\frac{250}{15} = -16.\bar{6}$

(c) From the graph, we can estimate the slope of the tangent line at P to be $-\frac{300}{9} = -33.\bar{3}$.

(b) Using the values of t that correspond to the points closest to P ($t = 10$ and $t = 20$), we have

$$\frac{-38.8 + (-27.8)}{2} = -33.3$$



2. (a) Slope = $\frac{2948 - 2530}{42 - 36} = \frac{418}{6} \approx 69.67$

(c) Slope = $\frac{2948 - 2806}{42 - 40} = \frac{142}{2} = 71$

(b) Slope = $\frac{2948 - 2661}{42 - 38} = \frac{287}{4} = 71.75$

(d) Slope = $\frac{3080 - 2948}{44 - 42} = \frac{132}{2} = 66$

From the data, we see that the patient's heart rate is decreasing from 71 to 66 heartbeats/minute after 42 minutes. After being stable for a while, the patient's heart rate is dropping.

3. $P(1, \frac{1}{2}) \quad f(x) = \frac{x}{1+x}$

(a) $Q(x, \frac{x}{1+x})$

$m_{PQ} = \frac{\frac{x}{1+x} - \frac{1}{2}}{x-1} \quad \text{let } g(x) = \frac{\frac{x}{1+x} - \frac{1}{2}}{x-1}$

x	$m_{PQ} = \frac{\frac{x}{1+x} - \frac{1}{2}}{x-1}$
0.5	$g(0.5) \approx 0.333333$
0.9	$g(0.9) \approx 0.263158$
0.99	$g(0.99) \approx 0.251256$
0.999	$g(0.999) \approx 0.250125$
1.5	$g(1.5) \approx 0.2$
1.1	$g(1.1) \approx 0.238095$
1.01	$g(1.01) \approx 0.248756$
1.001	$g(1.001) \approx 0.249875$

NOTE: your work does NOT have to be organized exactly like mine but your work must be clear and organized

NOTE: I put $\frac{\frac{x}{1+x} - \frac{1}{2}}{x-1}$ in y_1 in my calculator then did $y_1(0.5)$

(b) the slope appears to be approaching 0.25

(c) $P(1, \frac{1}{2}) \quad m = \frac{1}{4}$

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

$y = \frac{1}{4}x + \frac{1}{4}$

4. $P(3,1)$ $y = \sqrt{x-2}$

Ⓐ $Q(x, \sqrt{x-2})$

$$m_{\overline{PQ}} = \frac{\sqrt{x-2} - 1}{x-3} \quad \text{let } h(x) = \frac{\sqrt{x-2} - 1}{x-3}$$

x	$m_{\overline{PQ}} = \frac{\sqrt{x-2} - 1}{x-3}$
2.5	$h(2.5) \approx 0.585786$
2.9	$h(2.9) \approx 0.513167$
2.99	$h(2.99) \approx 0.501256$
2.999	$h(2.999) \approx 0.500125$
3.5	$h(3.5) \approx 0.449490$
3.1	$h(3.1) \approx 0.488088$
3.01	$h(3.01) \approx 0.498756$
3.001	$h(3.001) \approx 0.499875$

NOTE: your work MUST be organized but does NOT have to look exactly like mine

NOTE: I put $\frac{\sqrt{x-2} - 1}{x-3}$ in y_1 in my calculator then did $y_1(2.5)$

Ⓑ the slope of the tangent line appears to be approaching 0.5

Ⓒ $P(3,1)$ $m = \frac{1}{2}$

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

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

Ⓓ Do these graphs by hand (NOT on your calc)

