Lesson Review 2.doc

February 3, 2020 1:37 PM

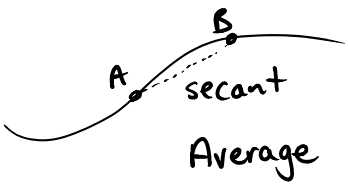
MCV4UI

Lesson R2

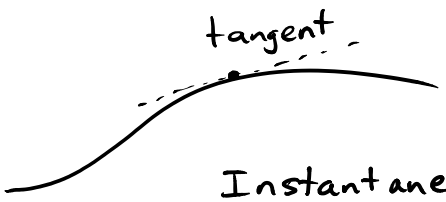
Review 2

Review of Limits Continued:

Recall: slope of a secant vs. slope of a tangent



Average



Instantaneous

Slope AB = $\frac{y_2-y_1}{x_2-x_1}$

where AB is a secant
(or sometimes called average rate of change)

Slope of the tangent at A $= \lim_{h\to 0} \frac{f(x+h)-f(x)}{(x+h)-x}$

$= \lim_{h\to 0} \frac{f(x+h)-f(x)}{h}$

1. Find the slope of the tangent to the curve $\mathbf{y = 3x^2 + 2x}$ at the point P(1 , 5) then find the equation of the tangent.

$$m = \lim_{h\to 0} \frac{f(x+h)-f(x)}{h}$$

$$= \lim_{h\to 0} \frac{3(x+h)^2+2(x+h)-(3x^2+2x)}{h}$$

$$= \lim_{h\to 0} \frac{3(x^2+2xh+h^2)+2(x+h)-(3x^2+2x)}{h}$$

$$= \lim_{h\to 0} \frac{3x^2+6xh+3h^2+2x+2h-3x^2-2x}{h}$$

$$= \lim_{h\to 0} \frac{h(6x+3h+2)}{h}$$

$$= 6x+2$$

@ P(1, 5)

$m = 6(1)+2$

$= 8$

$y = m(x-p)+q$

$y = 8(x-1)+5$

$y = 8x-3$

2. Find the equation of the tangent to the curve $y = \frac{2x+1}{x-1}$ at the point where x = 2.

$y = 5$

$$m = \lim_{h\to 0} \frac{\frac{2(x+h)+1}{(x+h)-1} - \frac{2x+1}{x-1}}{h}$$

$$= \lim_{h\to 0} \frac{\frac{2x+2h+1}{x+h-1} - \frac{2x+1}{x-1}}{h}$$

$$= \lim_{h\to 0} \frac{2x^2+2xh+x-2x-2h-1-(2x^2+2xh-2x+x+h-1)}{(x+h-1)(x-1)} \cdot \frac{1}{h}$$

$$= \lim_{h\to 0} \frac{-3h}{(x+h-1)(x-1)} \cdot \frac{1}{h}$$

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

@ $x = 2$: $m = \frac{-3}{(2-1)^2} = -3$

$y = -3(x-2)+5$

$y = -3x+11$

3. Find the equation of the tangent to the curve $y = \sqrt{x-2}$ at (6 , 2).

$$m = \lim_{h\to 0} \frac{\sqrt{x+h-2} - \sqrt{x-2}}{h} \cdot \frac{\sqrt{x+h-2} + \sqrt{x-2}}{\sqrt{x+h-2} + \sqrt{x-2}}$$

$$= \lim_{h\to 0} \frac{x+h-2-x+2}{h(\sqrt{x+h-2} + \sqrt{x-2})}$$

$$= \lim_{h\to 0} \frac{h}{h(\sqrt{x+h-2} + \sqrt{x-2})}$$

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

@ (6, 2)

$m = \frac{1}{2\sqrt{6-2}} = \frac{1}{4}$

$\frac{1}{4} = \frac{y-2}{x-6}$

$x-6 = 4y-8$

$x-4y+2=0$

HW: Pg. 137 #6 c)d)e), 9a)b)e)g) no graphs, 10 a)b)d)f)