APCalculusAB
Friday,September6,2013

Tests are not graded; sorry!

Bellwork:

1. Consider f(x) = -2x + 3.
2. Sketch a graph of f(x).
3. Find the slope of f(x) at the following x- values and fill in the chart.

x	-2	-1	0	1	2	3
slopes						

4. On the same axes, graph (x,slopes).
5. What do you notice? What do you think the graph of (x,slopes) would look like if f(x)=0.5x-3? If f(x)=100x+310? If f(x) = mx + b??

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

@ $x = 3$

$$= \lim_{h \to 0} \frac{f(3+h) - f(3)}{h}$$

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

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

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

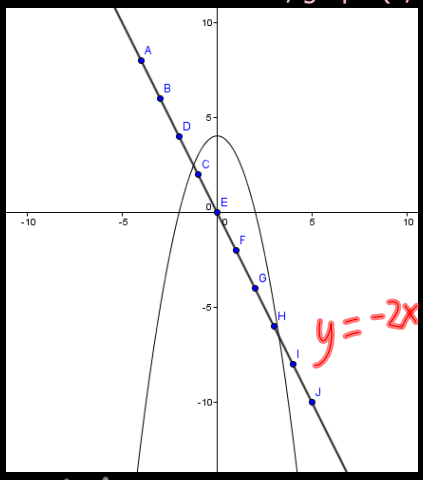
$$= \lim_{h \to 0} -2 = -2$$

1. Consider $f(x) = 4-x^2$
2. Sketch a graph of f(x).
3. Find the slope of f(x) at the following x- values and fill in the chart.

Katie Julie Taylor Emily Gavin Bryce Donald Grace Jake Ella

x	-4	-3	-2	-1	0	1	2	3	4	5
slopes $y=-2x$	8	6	4	2	0	-2	-4	-6	-8	-10

4. On the same axes, graph (x,slopes).



How can we use this line to find the slope of $f(x)=4-x^2$ at OTHER x values?

What is slope of f(x) at $x=\frac{1}{2}$?

Plug $x=\frac{1}{2}$ into eqn for slopes: $y=-2x$

slope @ $x=\frac{1}{2}$ is -1.

Check w/ DQ:

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

when $x=\frac{1}{2}$:

$f(x) = 4-x^2$

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

$$= \lim_{h\to 0} \frac{4-(\frac{1}{2}+h)^2-(4-(\frac{1}{2})^2)}{h}$$

$$= \lim_{h\to 0} \frac{4-[\frac{1}{4}+h+h^2]-(\frac{15}{4})}{h}$$

$$= \lim_{h\to 0} \frac{\frac{15}{4}-h-h^2-\frac{15}{4}}{h}$$

$$= \lim_{h\to 0} \frac{h(-1-h)}{h}$$

$$= \lim_{h\to 0} (-1-h) = -1$$

slope of tangent line @ $x=\frac{1}{2}$ is -1.

1. Consider $f(x) = 4-x^3$
2. Sketch a graph of f(x).
3. Find the slope of f(x) at the following x- values and fill in the chart.

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x	-4	-3	-2	-1	0	1	2	3	4	5
slopes										

Check w/DQ:

$$m_{tan} = \lim_{h\to 0} \frac{f(x+h)-f(x)}{h} \quad \text{when } x=1:$$

$$f(x) = 4-x^3$$

$$= \lim_{h\to 0} \frac{4-(1+h)^3-[4-1^3]}{h}$$

Shortcut to find slope of tangent line?

$$= \lim_{h\to 0} \frac{4-(1+3h^2+3h+h^3)-[4-1]}{h}$$

$$= \lim_{h\to 0} \frac{-3h^2-3h-h^3}{h}$$

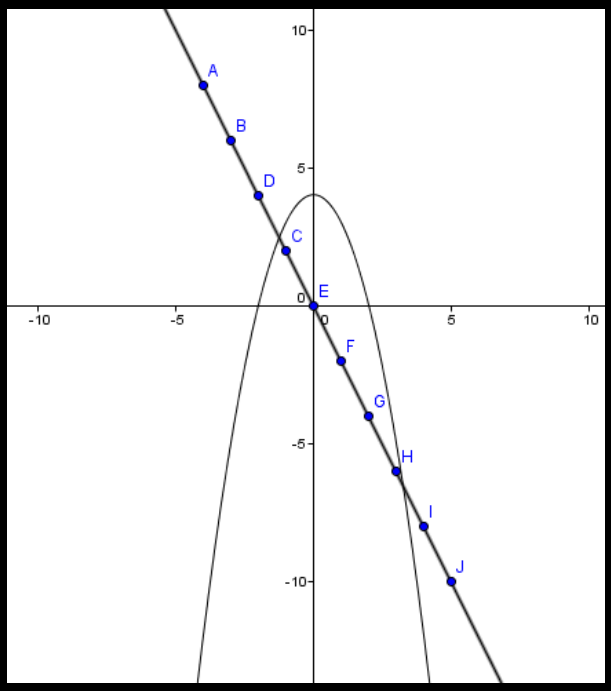
$$= \lim_{h\to 0} -3h-3-h^2 = -3$$

$$= \lim_{h\to 0} \frac{\frac{15}{4}-h-h^2-\frac{15}{4}}{h}$$

$$= \lim_{h\to 0} \frac{h(-1-h)}{h}$$

$$= \lim_{h\to 0} (-1-h) = -1$$

slope of tangent line @ $x=\frac{1}{2}$ is -1.



Use GGB to find a way to graph the slopes & the tangent lines @ diff x's so we don't have to calculate them by hand.

A: $\lim_{h \to 0} \frac{f(-2+h) - f(-2)}{h}$

B: $\lim_{h \to 0} \frac{f(-1+h) - f(-1)}{h}$

C: $\lim_{h \to 0} \frac{f(-3+h) - f(-3)}{h}$

Desmos app

$f(x) = 4 - x^2$

x	-4	-3	-2	-1	0	1	2	3	4	5
slopes										