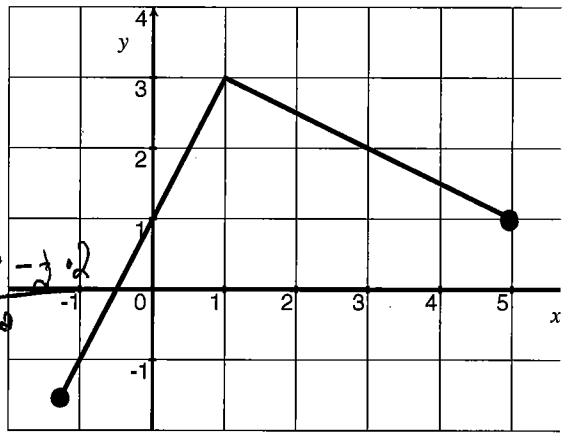
Quiz 3 Key

This is a two-stage quiz. During the first stage, use your knowledge & calculator to take this quiz. You have 15 min. In the second stage, you are now welcome to use your books, notes, and students in the class to retake the same quiz. You have 15 min. to write one solution (with everyone's name on it!!!) to be turned in for the group.

Show *all* your work. Reasonable supporting work must be shown for any partial credit.

1. The graph of g is shown on the right.
Let $f(x) = \sin(x)$. $f'(x) = \cos(x)$ (+1.5) note $\pi/6 \approx .5$



(a) [3] If $q(x) = \frac{f(x)}{g(x)}$, estimate $\frac{dq}{dx}|_{x=\frac{\pi}{6}}$.

Webwk 8 #7

$q'(x) = \frac{g(x)f'(x) - f(x)g'(x)}{(g(x))^2}$ (+1) quotient

$q'(\pi/6) = \frac{g(\pi/6)\cos(\pi/6) - \sin(\pi/6)g'(\pi/6)}{(g(\pi/6))^2}$ (+1.5) (+1.5) (+1.5)

$\approx \frac{2\frac{\sqrt{3}}{2} - \frac{1}{2}\cdot 2}{2^2} = \frac{\sqrt{3}-1}{4}$

(b) [3] If $h(x) = f(g(x))$, find $h'(0)$.

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$h'(x) = f'(g(x)) \cdot g'(x)$ chain (+1)

$h'(0) = \cos(g(0)) \cdot g'(0) = \cos(1) \cdot 2 \approx .54 \cdot 2 \approx 1$ (+1.5)

composite (+1.5) notation (+1.5)

(c) [2] Let's keep $h(x) = f(g(x))$. Find the equation of the line tangent to h at $x = 0$.

looking for $y - y_1 = m(x - x_1)$ (+1.5)

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m = slope of line tangent to h @ $x = 0$

$= h'(0) \approx 1$ (pass by?) (+1)

line goes thru $(0, h(0))$
$(0, f(g(0)))$
$(0, f(1))$
$(0, \sin(1))$ (+1.5)

so $y - \sin(1) = 1(x - 0)$

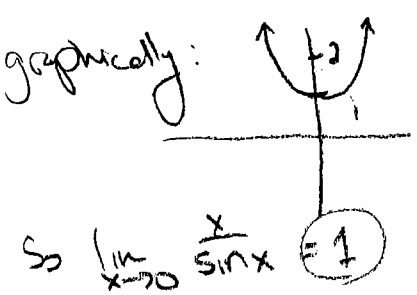
plug in (+1.5)

(d) [2] If $L(x) = \frac{x}{f(x)}$, find $\lim_{x\to 0} L(x)$.

Trig Packet Activity #2

i.e. $\lim_{x\to 0} \frac{x}{\sin(x)}$

graphically:



So $\lim_{x\to 0} \frac{x}{\sin x} = 1$

OR numerically

x	-.1	-.001	.001	.1
$\frac{x}{\sin(x)}$				

1

OR algebraically complex (-1) unless memorize $\lim_{\theta\to 0} \frac{\sin\theta}{\theta} = 1$ or know L'Hospital