My Big Chapter Two Review **2009ch2review.doc**

1. $\lim_{x\to 2} \dfrac{x^3-8}{x-2}$

2. $\lim_{h\to 0} \dfrac{\tan\left(\frac{\pi}{4}+h\right)-\tan\left(\frac{\pi}{4}\right)}{h}$

3. Write the equation of the line tangent to the graph of $y=5x-\sin x$ at $x=2\pi$

4. Let $f(x)=\begin{cases} 9x-4, & x\le 1 \\ 4x^2+1, & x>1 \end{cases}$
Is this function continuous and/or differentiable at $x=1$

5. If $\lim_{h\to 0} \dfrac{f(10+h)-f(10)}{h}=25$, then which of the following may we assume to be true:

I $f(10)=25$
II $f'(10)=25$
III f is both continuous and differentiable at $x=10$

6. Given the following information about differentiable functions $f(x)$ and $g(x)$ at $x=2$ determine the following:

x	$f(x)$	$g(x)$	$f'(x)$	$g'(x)$
2	8	2	2π	e

(a) $\dfrac{d}{dx}\left[f(g(x))\right]$ at $x=2$

(b) $\dfrac{d}{dx}\left(\dfrac{1}{f(x)}\right)$ at $x=2$

(c) $\dfrac{d}{dx}\left[\dfrac{g(x)}{f(x)}\right]$ at $x=2$

7. Find $\dfrac{d}{dx}\left[\sin\sqrt[3]{x}\right]$

8. Find $f'(x)$ if $f(x)=\dfrac{2x+3}{3x+2}$

9. Given $25x^2 + 8x - 16y^2 - 4y - 9 = 0$

(a) Find $\frac{dy}{dx}$

(b) Find any value(s) of x where the curve has a horizontal tangent

(c) Find the value(s) of y where the curve has a vertical tangent

10. What is the slope of the tangent line to the graph of $y = \tan(2x)$ at $x = \frac{\pi}{8}$?

Some calculator-friendly problems:

11. A particle moves along the x-axis so that any time $t \geq 0$, its velocity is given by $v(t) = t^3 \sin t$. Find the acceleration at $t = 3$ AND determine if the speed is increasinging or decreasing at $t = 3$

12. A pebble is thrown into a pond forming ripples whose radius increases at a rate of 4 inches/second. How fast is the area of the ripple changing when the radius is 12 inches?

13. On the interval $[0, \pi]$, where do the graphs of $f(x) = \tan x$ and $g(x) = x^2$ have parallel tangent lines?

14.
The position $s(t)$ of a particle is measured every 10 seconds and is provided in the table below.

t [in seconds]	0	10	20	30	40	50
$s(t)$ [in feet]	0	12	15	17	30	60

(A) Estimate the instantaneous velocity of the particle at $t = 25$ seconds. Include units.

(B) Find the average velocity for the time interval [0, 50]

15. Find the following:

(A) $\frac{d}{dx}[7\cos^3(\pi x)]$

(B) $\frac{d}{dt}\left[\frac{\pi}{3} r^2 h\right]$

16.

2008 AP® CALCULUS AB FREE-RESPONSE QUESTIONS (Form B)

6. Consider the closed curve in the xy-plane given by

$$x^2 + 2x + y^4 + 4y = 5.$$

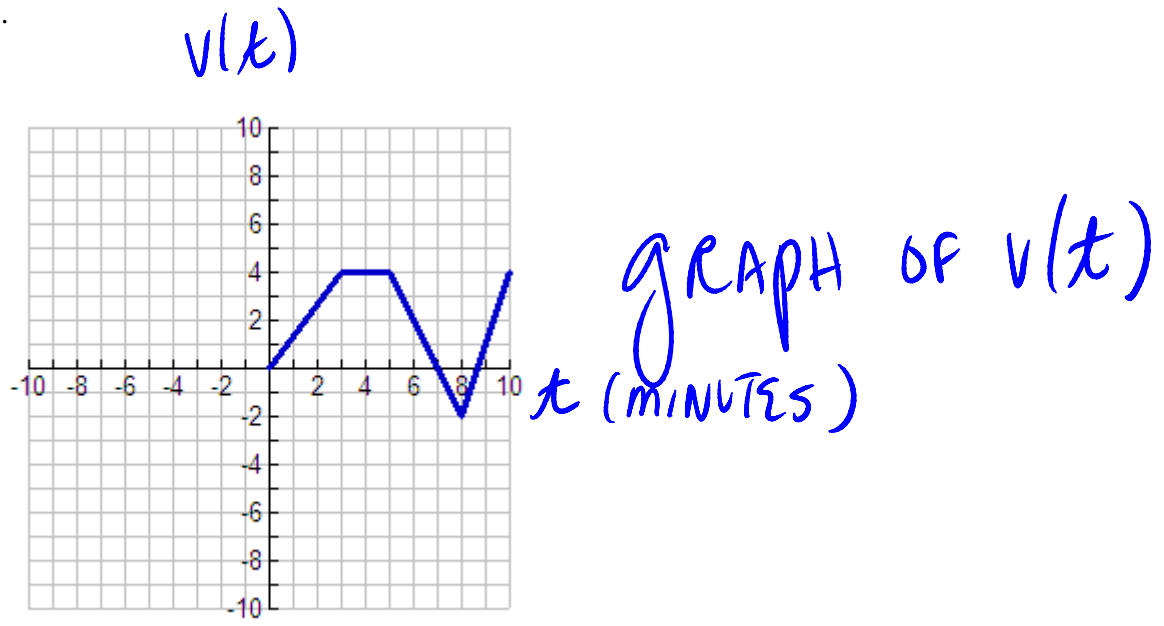
(a) Show that $\frac{dy}{dx} = \frac{-(x+1)}{2(y^3+1)}$.

(b) Write an equation for the line tangent to the curve at the point $(-2, 1)$.

(c) Find the coordinates of the two points on the curve where the line tangent to the curve is vertical.

(d) Is it possible for this curve to have a horizontal tangent at points where it intersects the x-axis? Explain your reasoning.

17.



The graph above is the velocity graph of a particle moving along the x-axis.

(A) When is the particle at rest? Justify.

(B) When does the particle change direction? Justify.

(C) What is the acceleration at time, t = 2.

Be sure to remember how to do anything that we have done on any projects, puzzles, or quizzes for this chapter. [I want to save paper!] ***Revised on 30 September 2009***