Fall 2005 Math 151

Week in Review 4

courtesy: Amy Austin

(covering sections 3.4 - 3.6)

Section 3.4

1. Compute the following limits:

   a.) $\lim_{x\to 0} \dfrac{\sin 3x}{5x}$

   b.) $\lim_{x\to 0} \dfrac{\sin^2 6x}{x^2}$

   c.) $\lim_{x\to 0} \dfrac{\tan x}{4x}$

2. Find the derivative of the following functions:

   a.) $f(x) = \dfrac{\sin x}{1+\cos x}$

   b.) $y = \sec x - 5\tan x$

3. Find $f'(\dfrac{\pi}{6})$ for $f(x) = -2\cot x$

4. Prove $\dfrac{d}{dx}\tan x = \sec^2 x$.

5. Find the tangent line to the graph of $f(x) = \sec x - 2\cos x$ where $x = \dfrac{\pi}{3}$.

Section 3.5

6. Given $h = f \circ g$, $g(3) = 6$, $g'(3) = 4$, $f'(3) = 2$, $f'(6) = 7$. Find $h'(3)$.

7. Suppose that $F(x) = f(x^4)$ and $G(x) = (f(x))^4$. Also, suppose it is given that $f(2) = -1$, $f(16) = 3$, $f'(2) = -2$ and $f'(16) = 4$. Compute $F'(2)$ and $G'(2)$.

8. Differentiate the following functions:

   a.) $f(t) = \sin(2t-1)$

   b.) $f(x) = x\cos(\sqrt{x})$

   c.) $f(x) = (4-3x^2)^4$

   d.) $h(x) = \dfrac{2}{\sqrt{x^3+5}}$

   e.) $f(x) = \tan^2(4x^4-5)$

   f.) $y = \sin^3 x + \sin(x^3)$

9. If $G(t) = (t + f(\tan 2t))^3$, find an expression for $G'(t)$.

Section 3.6

10. Find $\dfrac{dy}{dx}$ if $x^4 - 4x^2y^2 + y^3 = 0$

11. Find $\dfrac{dy}{dx}$ for $\cos(2x) - \sin(x+y) = 1$

12. Find the equation of the line tangent to $x^2 + y^2 = 2$ at (1,1).

13. Show that the curves $2x^2 + y^2 = 3$ and $x = y^2$ are orthogonal.