WORKSHEET 3.6,7 (40 points) NAME ______________________________

Using extra paper, show all steps clearly. Simplify all expressions at least to the point where like terms have been combined. BOX ANSWERS on the work. Unless otherwise indicated, each problem or part is worth 2 points.

1. Use the following table of values to compute the requested derivatives.

| $x$ | $f(x)$ | $g(x)$ | $f'(x)$ | $g'(x)$ |
|---|---|---|---|---|
| 1 | –3 | 4 | 5 | –1 |
| 2 | 5 | 1 | 3 | 7 |
| 3 | –2 | 2 | 1 | 8 |
| 4 | 6 | 5 | 2 | –3 |
| 5 | 9 | 3 | 4 | –4 |

a. $H(x)=5f(x)-3g(x)$. Find $H'(1)$

b. $H(x)=\dfrac{f(x)}{g(x)}$. Find $H'(4)$

c. $H(x)=\left[g(x)\right]^5$. Find $H'(2)$

d. $H(x)=g\left(x^2-7\right)$. Find $H'(3)$

e. $H(x)=f\left(g(x)\right)$. Find $H'(5)$

2. $f(x)=\left[(5x+2)^3-x^6\right]^4$ . Find $f'(x)$

3. $f(x)=\cos^4(7x)$. Find $f'(x)$

4. $f(x)=\sec x$. Find $f''(x)$

5. $f(x)=\sin\left(5x^3\right)$ . Find $f''(x)$

6. $f(x)=\sin(\tan 3x)$. Find $f'(x)$

7. $4x^3+2xy^2-y^5=7$. Find $y'$ (Your answer <u>should</u> contain both *x* and *y*.)

8. $\tan(xy)=x$. Find $y'$ (Your answer <u>should</u> contain both *x* and *y*.)

9. $f(x)=x^3+4x^2-3x+5$. Find <u>exact</u> (for full credit this must be done using calculus) points (both *x*- and *y*-coordinates) where the line tangent to the curve is horizontal.

10. $3y^2+5x-y\sin x=27$. Find an equation of the tangent line at $P(0,3)$.

11. If $y=\sin 2x-\cos 2x$, determine a generalized set of values for which the tangent line will be horizontal.

OVER

12. Adapted from the Free Response section of the 1992 AP Calculus exam (point distribution of the parts: 2, 2, 3, 3)
Consider the curve given by $y + \cos y = x + 1$ for $0 \le y \le 2\pi$

a. Determine an expression (implicitly, which means that it may contain *x*'s and *y*'s) for the slope of the tangent line-- $y'$ or $\frac{dy}{dx}$.

b. Find an equation for the tangent line at the point where $y = \pi$

c. Write an equation for each vertical tangent line to the curve.

d. Determine an expression for $\frac{d^2y}{dx^2}$ solely in terms of the variable $y$