Show ALL work on your own paper to get full credit. This assignment is due at the beginning of class on **Wednesday, March 9**.

1. (3.6) Find $\frac{dy}{dx}$ for the equation $x \sin y + \cos(x - 2y) = \cos y$

2. (3.6) Find $\frac{dx}{dy}$ for the equation $x^3 - x^4 y^2 = xy$ by viewing $x$ as dependent on $y$.

3. (3.6) Do Problem #26 in Section 3.6 of your textbook, but find the equation of the tangent line at the point $(2\sqrt{3}, 1)$ instead of $(0, -2)$.

4. (3.6) The curves $x^2 + y^2 = 6x$ and $x^2 + y^2 = 3y$ intersect at the point $(\frac{6}{5}, \frac{12}{5})$. Show that the tangent lines to the two curves at this point are orthogonal.

5. (3.7) Find a unit tangent vector to the curve $\mathbf{r}(t) = <t^2 \cos t, 1 + \sin t>$ at the point where $t = \pi$.

6. (3.7) Suppose the position of a particle at time $t$ is given by $\mathbf{r}(t) = <\frac{t^2}{t+1}, \frac{1}{\sqrt{t^2+9}}>$.

7. (3.8) Find $f'''(x)$ for the following.
   
   (a) $f(x) = \sqrt{2x+1}$
   
   (b) $f(x) = \frac{x}{1-2x}$

8. (3.8) Find $y^{(26)}$ if $y = -\cos(8x)$.

9. (3.8) Find a formula for the $n$th derivative, $f^{(n)}(x)$, of $f(x) = \frac{1}{7x - 1}$.

   (Hints: Don’t simplify the coefficients as you take derivatives so that you can see the patterns. Also, keep the “7’s” from the chain rule separate from the coefficients from the power rule.)

10. (3.8) The position of a particle moving in a straight line is given by $s(t) = t^4 - 4t^3 + 2$.

    (a) Find the position of the particle at the times when the acceleration is 0.

    (b) Find the acceleration at the times where the object is instantaneously at rest.

11. (3.8) Given $P(x) = ax^2 + bx + c$, find the values of $a, b,$ and $c$ such that $P(1) = 5$, $P'(2) = 6$, and $P''(3) = 8$.

12. (3.9) Consider the parametric equations $x = t^3 - 3t^2$, $y = t^3 - 3t$.

    (a) Find an equation of the tangent line to the curve at the point $(0,18)$.

    (b) Find the points on the curve where the tangent line is horizontal.

    (c) Find the points on the curve where the tangent line is vertical.

13. (3.9) For what value(s) of $t$ is the tangent line to the curve $x = t^3 + 4t$, $y = 6t^2$ parallel to the line with equations $x = 8t$, $y = 12t - 5$?