Each problem is worth one point for a total of ten points. The review sheet will count towards your quiz grade. It is due at the beginning of class on Friday, October 31.

1. Use the definition of derivative to show \( \frac{d}{dx} \left( \frac{1}{x^2} \right) = -\frac{2}{x^3} \).

2. Find the points at which \( f(x) = 3x^4 - 10x^3 + 9x^2 + 7 \) has horizontal tangent lines.

3. If \( f \) is a differentiable function, find an expression for the derivative of \( y = \frac{1 + xf(x)}{\ln x} \).

4. A balloon is rising at a constant speed of 5 ft/sec. A boy is cycling along a straight road at a speed of 15 ft/sec. When he passes under the balloon, it is 45 ft above him. How fast is the distance between the boy and the balloon increasing 3 seconds later?
5. Calculate $y'$. Simplify, if possible.

a. $y = \sqrt{\cos(x^2)}$

b. $x^2 + y^3 = \frac{1}{xy}$

c. $y = x^{\tan 2x}$

d. $y = \frac{e^{x} \sqrt{x^2 + 1}}{(x + 2)^2}$

e. $y = (\arcsin \sqrt{x})^2$

f. $y = (3x + 1)^3(x - 2)^4$