1. If $g(x)$ is a differentiable function and assuming that $g(x) \neq 0$ show that

$$\frac{d}{dx}\left[\frac{1}{g(x)}\right] = -\frac{g'(x)}{[g(x)]^2}$$

(a) By using the definition of the derivative.

(b) By using the quotient rule.

2. Find the derivative of

$$f(x) = \frac{x}{1+x^2}$$

and the equation of the tangent line to $f(x)$ at the point $(3, 0.3)$.

3. Find f' and f'' for

$$f(x) = e^x(x^3 + \sqrt{x} + 1)$$

4. If $f(3) = 4$, $g(3) = 2$, $f'(3) = -6$, and $g'(3) = 5$, find the following numbers

(a) $(fg)'(3)$

(b) $\left(\frac{f}{f-g}\right)'(3)$

5. Find f' and f'' for

$$f(x) = x - 3x^{1/3}$$