Homework 8 - Math 140 **Name:** _____

Calculate the following derivatives.

1. $\frac{d}{dx}\sqrt{x}(x^2-4)$

2. $\frac{d}{dx}\left(\frac{3}{x}-\frac{4}{x^2}\right)$

3. $\frac{d}{dt}(t-1)(t+1)$

4. $\frac{d}{dx}\frac{x^4-5x^3+6x^2}{x^2}$

5. $\frac{d}{dt}(\sqrt{t})^3$

6. $\frac{d}{dx}\frac{x^3}{\sqrt{x}}$

7. $\frac{d}{dx}x^2e^x$

8. $\frac{d}{dx}x\ln x$

9. Product rule concept questions?

10. A manufacturer's total monthly revenue is $R(x) = 240x - 0.05x^2$ where x is the number of products sold.

    (a) Find the marginal revenue $R'(x)$.

    (b) Calculate $R'(80)$.

    (c) Calculate $R(81) - R(80)$. Is it close to the previous answer? Should it be?

11. Suppose that the total cost to produce x units is $C(x) = 3x^2 + x + 500$.

    (a) Find the marginal cost $R'(x)$.

    (b) Calculate $C'(40)$.

12. The average cost per item from the previous problem is $A(x) = 3x + 1 + \dfrac{500}{x}$.

    (a) Find the derivative of the average cost function.

    (b) Is the average cost increasing or decreasing when the level of production is $x = 10$?