Marginal Analysis Worksheet

1. (Armstrong & Davis, section 3.2 problem 13) The Country Day Company determines that the daily cost of producing lawn tractor tires can be modeled by $C(x) = 100 + 40x - 0.001x^2, 0 \le x \le 300$ where *x* represents the number of tires produced each day and $C(x)$ is the total cost, in dollars, of producing the tires.
   a. Determine $C'(x)$, the marginal cost function.
   b. Evaluate and interpret $C'(200)$.

4. (Armstrong & Davis, section 3.2 problem 21) A telemarketer determines that the monthly profit from selling magazine subscriptions can be modeled by $P(x) = 5x + x^{1/2}, 0 \le x \le 100$ where *x* is the number of magazine subscriptions sold per month and $P(x)$ is the profit in dollars.
   a. Determine $P'(x)$, the marginal profit function.
   b. Evaluate and interpret $P'(55)$.

6. (Tan, section 3.4 problem 13) The weekly demand for the Pulsar 25 color console television is $p = 600 - 0.05x$ $(0 \le x \le 12{,}000)$ where *p* denotes the wholesale unit price in dollars and *x* denotes the quantity demanded. The weekly total cost function associated with manufacturing the Pulsar 25 is given by $C(x) = 0.000002x^3 - 0.03x^2 + 400x + 80{,}000$ where $C(x)$ denotes the total cost incurred in producing *x* sets.
   a. Find the revenue function *R* and the profit function *P*.
   b. Find the marginal cost function C', the marginal revenue function R', and the marginal profit function P'.
   c. Compute $C'(2000)$, $R'(2000)$, and $P'(2000)$ and interpret your results.

8. (Armstrong & Davis, section 3.2 problem 27) The NewJoy Company hires a consulting firm to audit their books and consequently revise their price and cost functions to $p(x) = 23$ and $C(x) = \frac{x^2}{95} + \frac{7}{2}x + 5500$.
   a. Algebraically derive the profit function *P* and simplify it.
   b. Evaluate $P(500)$ and interpret.
   c. Evaluate $P'(500)$ and interpret.
9. (Armstrong & Davis, section 3.2 problem 29) The Vroncom Company determines that the price-demand function for their handheld computer device is $p(x) = -\frac{x}{30} + 300$. They know that their fixed costs are \$150,000 and variable cost is 30 dollars per device.
   a. Determine the revenue function and the cost function.
   b. Determine the profit function. Find the smallest and largest production levels *x* so that the company realizes a profit.
   c. Evaluate $P'(1000)$ and interpret.