Name _____

Homework 4
Section 2.3

1. (3ea) Richard is a photographer that has an art show coming up, where he wants to display a new picture which he plans to take with a new camera. The new camera will cost him $2700, and each picture will cost him $120 to produce (develop, print, frame, etc.). He plans to sell his pictures for $300 each at the art show.

   - *Identify any functions and/or variables which you use to answer these questions.*

   (a) What is Richard's break-even quantity?

   (b) Richard judges that he needs to make a profit of at least $1500 in order to deem the art show a success. How many pictures must he produce and sell in order for him to call it a successful show?

2. (3,4) Suppose that the supply and demand functions for cashews at a particular retailer are given by

$$p = S(q) = 2q - 1.5 \quad \text{and}$$
$$p = D(q) = 26 - 3q$$

where $p$ is the price per pound and $q$ is the quantity in hundreds of pounds.

(a) At a price of \$11 per pound does the retailer have a shortage or a surplus of cashews? How many pounds of cashews is the shortage or surplus?

(b) Find the equilibrium price and the equilibrium quantity.

3. (3) Dennis the mad scientist determines that his profit, in hundreds of dollars, from raising and selling $x$ emus is given by the function

$$P(x) = -0.1x^2 + 17.2x - 108.$$

What is Dennis's maximum profit from emu sales?

4. (4) Suppose the price of an item, $p$, and the quantity $q$ of the item sold are related by the function $p = 60 - \frac{1}{4}q$. The cost of producing the item is \$8 per item, plus a fixed cost of \$400.
What is the company's **profit** function?