Sols

Quiz 3: Section 1.4-1.5

3 1. A car wash operator pays \$35,000 for a franchise, then spends \$10 per car wash, which costs the consumer \$15. Find the profit function for the car wash operator.

$C(q) = 10q + 35000$

$R(q) = 15q$

$\pi(q) = 15q - (10q + 35000) = 5q - 35000$

3 2. The *equilibrium price and quantity* is similar to the break-even point for profit. Given a supply curve and a demand curve, the *equilibrium point* is where the two curves intersect; that is, where the two quantities are equal to each other.
For a certain good, the supply curve is given by $q = 100 - 2p$ and the demand curve is given by $q = 3p - 50$. Find the equilibrium price, p, and quantity, q.

$q = 100 - 2p$

$q = 3p - 50$

$100 - 2p = 3p - 50$

$150 = 5p$

$p = 30$

$q = 3(30) - 50$

$= 90 - 50$

$= 40$

$q = 40, p = 30$

3. Assume that the number of zebra mussels in a bay is growing exponentially. Let $P(t)$ represent the number of zebra mussels as a function of the number of years since 2010. So a function modeling the population is of the form $P(t) = P_0 a^t$. Given that there were 2700 mussels at the start of 2010 and 3186 at the start of 2011,

2 **(a)** Find the base, a. You may round your answer to two decimal places.

2 **(b)** Find the relative growth rate, r.

(a) $P_0 = 2700$

$P(1) = 2700a^1 = 3186$

$a = \frac{3186}{2700} = 1.18$

(b) $r = a - 1$

$r = 1.18 - 1$

$r = .18$