MATH 122 Spring, 2012 Quiz #2 Name: M²

1. A company that makes overpriced retro style blenders has fixed costs of \$16,800 and variable costs of \$45 per machine. The company plans to sell the machines for \$125 each. Let q represent the number of blenders. Give formulas for the cost function $C(q)$ and the revenue function $R(q)$. What is the break-even point in terms of number of blenders?

$C(q) = 16800 + 45q$ $\quad R(q) = 125q$

Break even: $C = R$

$16800 + 45q = 125q$

$80q = 16800$ $\quad q = 210$

2. When X-rays pass through a heavy concrete shield the intensity of the radiation R decreases exponentially; that is, $R = R_0 e^{kx}$. The initial amount is R_0, the thickness of the concrete is x, and the "decay" rate is k. It takes 3 feet of concrete to remove 75% of the X-ray radiation (so 25% remains). Determine the decay rate k.

$0.25R_0 = R_0 e^{3k}$

$0.25 = e^{3k}$

$\ln(0.25) = 3k$

$\frac{\ln(0.25)}{3} = k$

$k = -0.462$

If you erroneously used 0.75 in the first line you would get $k = -0.0959$