Mathematics 172

Quiz 1 Name: Key

***You must show your work to get full credit.***

**1.** Let $N(t)$ be a solution to the initial problem

$$N'(t) = .12N(t), \quad N(0) = 5$$

(a) Give a formula for $N(t)$. $N(t) =$ $5e^{.12t}$

(b) What is $N(20)$? $N(20) =$ $5e^{.12(20)} = 55.116$

**2.** Let $r$ be a constant and $P(t)$ such that

$$P'(t) = rP(t), \qquad P(0) = 200, \qquad P(5) = 175.$$

Find $r$ and $P(20)$. $r =$ $-.0267$

$P(t) = P(0)e^{rt} = 200e^{rt}$

So $P(5) = 200e^{5r} = 175$

$e^{5r} = \frac{175}{200}$

$5r = \ln(175/200)$

$r = \frac{\ln(175/200)}{5}$

$= -.0267$

Thus $P(t) = 200e^{-.0267t}$

and therefore $P(20) = 200e^{-.0267(20)}$

$= 117.24$

$P(20) =$ $117.24$