Mathematics 172

Quiz 1 Name: Key

You must show your work to get full credit.

1. What is the solution to the initial value problem

$$P'(t) = .8P(t), \qquad P(0) = 500.$$

$P(t) =$ $500e^{.8t}$

The solution to $P'(t) = rP(t)$ is $P(t) = P(0)e^{rt}$. In this case this is $P(t) = 500e^{.8t}$

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

$$N'(t) = rN(t), \qquad N(0) = 200, \qquad N(5) = 175.$$

Find r and $N(20)$.

$r =$ $-.0267$

The solution is $N(t) = N(0)e^{rt} = 200e^{rt}$

Then $N(5) = 200e^{5r} = 175$

$e^{5r} = 175/200$

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

$r = \ln(175/200)/5 = -.0267$

$N(20) =$ 117.25

So $N(t) = 200e^{-.0267t}$

and $N(20) = 200e^{-.0267(20)} = 117.25$