Mathematics 172

Quiz #5

You must show your work to get full credit.

1. Solve $\frac{dN}{dt} = .05N$, $N(0) = 75$.

2. Find the doubling time for an exponentially growing population with intrinsic growth rate $r = .1$.

Solution for 1.

In genreal the solution to $\frac{dN}{dt} = rN$ is $N(t) = N(0)e^{rt}$. In our case this just becomes

$$N(t) = 75e^{.05t}.$$

Solution for 2.

If $r = .1$, then the equation is $\frac{dN}{dt} = .N$ which has solution $N(t) = N(0)e^{.1t}$. To find the doubling time we need to solve

$$N(0)e^{.1t} = 2N(0).$$

Canceling the $N(0)$'s and taling ln gives

$$.1t = \ln(2)$$

and thus

$$t = \frac{\ln(2)}{.1} = 6.93147$$