Mathematics 172

Quiz 4 Name: Key

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

**1.** Let $A(t)$ be an exponential function with $A(0) = 50$ and $A(3) = 400$. Given a formula for $A(t)$.

$A(t) = A_0 a^t$

$A(0) = A_0 a^0 = A_0 = 50$

$A(3) = A_0 a^3 = 50 a^3 = 400$

$a^3 = \frac{400}{50} = 8$

so $a = 8^{\frac{1}{3}} = 2$

$A(t) = 50(2)^t$

**2.** Let $N(t)$ be an exponential function with $N(3) = 10.2$ and $N(4.5) = 8.1$. Give a formula for $N(t)$. $N(t) = N_0 a^t$

$N(3) = N_0 a^3 = 10.2$

$N(4.5) = N_0 a^{4.5} = 8.1$

so $\frac{8.1}{10.2} = \frac{N(4.5)}{N(3)} = \frac{N_0(a)^{4.5}}{N_0(a)^3} = a^{1.5}$

$a^{1.5} = \frac{8.1}{10.2}$

$a = (8.1/10.2)\text{^}(1/1.5) = .858$

$N(t) = N_0 (.858)^t$

$N(3) = N_0(.858)^3 = 10.2$

$N_0 = 10.2/(.858)\text{^}3$

$= 16.15$

$N(t) = 16.15\,(.858)^t$

**3.** Let $P(t) = 5.1(1.2)^t$. Solve $P(t) = 100$.

$5.1(1.2)^t = 100$

$(1.2)^t = \frac{100}{5.1}$

$t \ln(1.2) = \ln(100/5.1)$

$t = \ln(100/5.1)/\ln(1.2)$

$= 16.32$

$t = 16.32$