MAC1140 SEC29 Quiz 10-08-2007 4.6 4.7

Mr. Fei Hua (fhua@math.fsu.edu)

Full Name: Fei Hua Sec#: Date:

1.

[4.6.2aPT]Find the effective rate of interest for 7% compounded monthly.

- $(1+0.07)^{12}$
- $(1+0.07)^{12}-1$
- $(1+\frac{0.07}{12})^{12}$
- ● $(1+\frac{0.07}{12})^{12}-1$

$P(1+r_E) = P(1+\frac{r_N}{n})^{n\cdot 1}$

$r_E = (1+\frac{0.07}{12})^{12}-1$

2.

[4.6.2bPT]How long will it take money to triple if it is invested at 10% compounded continuously?

- $0.1\ln 3$
- $\frac{\ln(\frac{1}{3})}{0.1}$
- $\frac{\ln 3}{\ln(1+0.1)}$
- ● $\frac{\ln 3}{0.1}$

$A = Pe^{rt}$

$3P = Pe^{rt}$.

$3 = e^{0.1\cdot t}$.

$\ln 3 = \ln e^{0.1t}$.

$\ln 3 = 0.1t. \Rightarrow t = \frac{\ln 3}{0.1}$

3.

[4.7.1bPT]The population, N (in millions), of a country may be approximated by the formula $N(t) = N_0e^{kt}$. If the population is 35 million initially and 45 million after 1 year, what will be the population after 2 years?

- ● $35e^{2\ln\frac{9}{7}}$
- $45e^{2\ln\frac{9}{7}}$
- $45e^{2\ln\frac{7}{9}}$
- $35e^{2\ln\frac{7}{9}}$

$N_0 = 35$

$N(1) = 45$

$N(2) = ?$

$N(1) = 45 \Rightarrow 35\cdot e^{k\cdot 1} = 45 \Rightarrow e^k = \frac{45}{35} = \frac{9}{7} \Rightarrow k = \ln\frac{9}{7}$

So

$N(2) = 35\cdot e^{k\cdot 2} = 35e^{2\cdot\ln\frac{9}{7}}$.

4.

[4.7.1cPT]Iodine I-31 is a radioactive material that decays according to $A(t) = A_0 e^{-0.053t}$, where A_0 is the initial amount present and $A(t)$ is the amount present at time t (in days). What is the half-life of iodine I-31?

- ○ $\frac{1-\ln 2}{0.053}$
- ○ $\frac{\ln \frac{1}{2}}{0.053}$
- ● $\frac{\ln 2}{0.053}$
- ○ $\frac{1}{0.053 \ln \frac{1}{2}}$

$\frac{1}{2}A_0 = A_0 e^{-0.053 \cdot t}$

$\ln \frac{1}{2} = \ln e^{-0.053t}$

$t = \frac{\ln \frac{1}{2}}{-0.053} = \frac{\ln 2^{-1}}{-0.053} = \frac{-1 \ln 2}{-0.053} = \frac{\ln 2}{0.053}$

5.

[4.7.2aPT]Find the exponential function, $N(t) = N_o e^{kt}$, that satisfies the conditions $N(0) = 21$, $N(3) = 7$.

- ● $N(t) = 21e^{(\frac{\ln \frac{1}{3}}{3})t}$
- ○ $N(t) = 21e^{(\frac{\ln \frac{1}{7}}{7})t}$
- ○ $N(t) = 21e^{(\frac{\ln 3}{3})t}$
- ○ $N(t) = 7e^{(\frac{\ln 21}{3})t}$

$N(0)=21 \Rightarrow N_o e^{k \cdot 0} = 21 \Rightarrow N_o = 21$

$N(3)=7 \Rightarrow 21e^{k \cdot 3} = 7 \Rightarrow e^{3k} = \frac{1}{3} \Rightarrow 3k = \ln \frac{1}{3}$

$\Rightarrow k = \frac{\ln \frac{1}{3}}{3}$.

$N(t) = 21 e^{(\frac{\ln \frac{1}{3}}{3}) \cdot t}$.