

# Advanced Math

3-5

(Day 1)

## Exponential and Logarithmic Models

Exponential Growth and Decay Model:

$$y = ae^{kx}$$

↗ constant  
↓ start value (0, a)

Find the missing information given interest is continuously compounded.

7) Initial Investment: \$1000; Annual Percentage Rate: 12%

Time to Double: 5.776 years

Amount after 10 years:

$$A = Pe^{rt}$$

a)  $2000 = 1000e^{.12t}$   
 $\ln 2 = \ln e^{.12t}$   
 $\frac{\ln 2}{.12} = t$   
 $5.776 = t$

b)  $A = 1000e^{.12(10)}$   
 $\$3320.12 = A$

Find the missing information for each radioactive isotope.

25)  $^{226}\text{Ra}$  has a half-life of 1620 years. Given an initial quantity of 10g, how much will remain after 1000 years?

$$y = ae^{kt}$$

Find k  
 $5 = 10e^{k(1620)}$   
 $\ln 5 = \ln e^{1620k}$   
 $\frac{\ln(5)}{1620} = \frac{1620k}{1620}$   
 $k = -4.279 \times 10^{-4}$

$y = 10e^{(-4.279 \times 10^{-4} \cdot x)}$   
 $y = 10e^{(-4.279 \times 10^{-4} \cdot 1000)}$   
 $y = 6.519\text{g}$

Find the exponential function  $y = ae^{bx}$  that fits the given information.

\*) Contains points (0, 4) and (2, 11)

↑  
a

$$y = 4e^{bx} \rightarrow y = 4e^{.506x}$$

WORK

$$\frac{11}{4} = \frac{4e^{b \cdot 2}}{4}$$

$$\ln \frac{11}{4} = \ln e^{2b}$$

$$\frac{\ln(\frac{11}{4})}{2} = \frac{2b}{2}$$

$$.506 = b$$

Assignment:

pg. 346

1-6 all,

8-14 even, 18,

26-38 all.