15. The element plutonium-239 is highly radioactive. Nuclear reactors can produce and also use this element. If the half-life of plutonium-239 is 24,360 years, what is the value of k for this element?

$$y = ae^{-kt}$$

$$\frac{\frac{1}{2}a}{a} = \frac{a\,e^{-k(24{,}360)}}{a}$$

$$\ln\frac{1}{2} = \ln e^{-24{,}360k}$$

$$\frac{\ln\frac{1}{2}}{-24{,}360} = \frac{-24{,}360k}{-24{,}360}$$

$$k$$

14. How long will it take for the rabbit population in #13 to reach 65,000?

The population of rabbits in an area is modeled by the growth equation $P = 8e^{0.26t}$, where P is in thousands and t is in years. How many rabbits will there be in 6 years?

$P = 8e^{.26t}$

$\frac{65}{8} = \frac{8e^{.26t}}{8}$

$\ln 8.125 = \ln e^{.26t}$

$\frac{\ln 8.125}{.26} = \frac{.26t}{.26}$

yrs $\approx t$

7. A home was purchase in 2003 for $152,000. In 2012, the home was worth $175,000. To the nearest tenth of a percent, what was the rate of inflation per year?

$$y = a(1+r)^t$$

$$\frac{175,000}{152,000} = \frac{152,000(1+r)^9}{152,000}$$

$$\sqrt[9]{\frac{175}{152}} = \sqrt[9]{(1+r)^9}$$

$$\sqrt[9]{\frac{175}{152}} = 1+r$$

$$\sqrt[9]{\frac{175}{152}} - 1 = r$$

$$.\_\_\_\_ = r$$

$$\% \approx r$$

8. An investment is now worth $4500. If the rate of increase was 5.3% over 4 years, how much was originally invested?

$$y = a(1+r)^t$$

$$\frac{4500}{1.053^4} = \frac{a(1+.053)^4}{(1.053)^4}$$

$\$ \quad \approx 9$