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?

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

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

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

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

$$\approx k$$

3. The Gross Domestic Product (GDP) of the United States grows about 2.8% per year. In 2001 the GDP was $9.891 trillion. If this rate of growth continues, what will the GDP of the US be in 15 years?

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

$$y = 9.891(1+.028)^{15}$$

$$y = \$ \qquad \text{trillion}$$

16. A certain medication is eliminated from the bloodstream at a steady rate. It decays according to the equation $y = ae^{-0.25t}$, where t is in hours. After 5 hours, a patient still has 22 cc's of the medication still in their bloodstream. How much of the medication was originally administered?

$$\frac{22}{e^{-.25(5)}} = \frac{ae^{-.25(5)}}{e^{-.25(5)}}$$

cc's $\approx a$