1) $-8e^{k-10} = -33$

$$e^{k-10} = \frac{-33}{-8}$$

$$\ln e^{k-10} = \ln\left(\frac{33}{8}\right)$$

$$k-10 = \ln\left(\frac{33}{8}\right)$$

$$k = 10 + \ln\left(\frac{33}{8}\right)$$

$$k = 11.4171$$

$$\ln\left(\frac{33}{8}\right) + 10$$

2) $-9e^{x} = -64$

$$e^{x} = \frac{-64}{-9}$$

$$x = \ln\left(\frac{64}{9}\right) = 1.9617$$

3) $9e^{7n-7} = 3$

$$e^{7n-7} = \frac{1}{3}$$

$$7n-7 = \ln 1/3$$

$$7n = 7 + \ln(1/3)$$

$$n = \frac{7+\ln(1/3)}{7} = 0.8431$$

4) $-9e^{8a-10} - 1 = -21$

$$-9e^{8a-10} = -20$$

$$e^{8a-10} = 20/9$$

$$8a-10 = \ln(20/9)$$

$$8a = 10 + \ln(20/9)$$

$$a = \frac{10+\ln(20/9)}{8}$$

$$a = 1.3498$$

5) $\ln 9 + \ln(x+3) = \ln 36$

$$\ln(9(x+3)) = \ln 36$$

$$e \qquad e$$

$$9(x+3) = 36$$

$$9x + 27 = 36$$

$$9x = 9$$

$$x = 1$$

6) $\ln(x^2 - 9) - \ln 4 = 4$

$$\ln\left(\frac{x^2-9}{4}\right) = 4$$

$$e \qquad e$$

$$\frac{x^2-9}{4} = e^4$$

$$x^2 - 9 = 4e^4$$

$$x^2 = 9 + 4e^4$$

$$x = \pm\sqrt{9+4e^4}$$

$$x = \pm 15.0795$$

7) Abhasra invests $1,162 in a retirement account with a fixed annual interest rate compounded 6 times per year. After 15 years, the balance reaches $2,858.02. What is the interest rate of the account?

$$A = P\left(1+\frac{r}{n}\right)^{nT}$$

$$2858.02 = 1162\left(1+\frac{r}{6}\right)^{(6)(15)}$$

$$\sqrt[90]{2.4596} = \sqrt[90]{\left(1+\frac{r}{6}\right)^{90}}$$

$$1.0101 = 1 + r/6$$

$$0.0101 = \frac{r}{6}$$

$$0.0603 = r$$

rate = 6.03%

8) Krystal invests $7,442 in a savings account with a fixed annual interest rate compounded continuously. After 7 years, the balance reaches $13,147.61. What is the interest rate of the account?

$$A = Pe^{rT}$$

$$13147.61 = 7442\,e^{r \cdot 7}$$

$$1.7667 = e^{7r}$$

$$\ln(1.7667) = 7r$$

$$\frac{\ln(1.7667)}{7} = r$$

$$0.0813 = r$$

rate = 8.13%

9. From 2000 - 2010 a city's population decreased continuously at a rate of 2.5%. If the city had 2,950,000 people in 2000, determine the city's population in 2008.

rate = −.025

$A = Pe^{rT}$

$A = 2950000\,e^{-.025(8)}$

$A = 2415256.$

10. Your new computer cost $1500 but it depreciates at a rate of about 18%. When will the computer first be worth less than $500?

$A = P\left(1 + \frac{r}{n}\right)^{nT}$

$500 = 1500\left(1 + \frac{-.18}{1}\right)^{1(T)}$

$\frac{1}{3} = (0.82)^{T}$

$\log_{.82}\left(\frac{1}{3}\right) = T$

$5.5359 = T$ years

$A = Pe^{rT}$

$500 = 1500\,e^{-.18T}$

$\frac{1}{3} = e^{-.18T}$

$\ln\left(\frac{1}{3}\right) = -.18T$

$\frac{\ln(1/3)}{-.18} = T$

$6.1035 = T$