Solve. $12(5^{2x-1}) + 2 = 73$

$$5^{2x-1} = \frac{71}{12}$$

$$\log_5\left(\frac{71}{12}\right) = 2x - 1$$

$$x = \frac{\frac{\log 71/12}{\log 5} + 1}{2} = 1.05$$

Solve. $10e^{x+3} - 8 = 55$

$$e^{x+3} = 6.3$$

$$\ln 6.3 = x + 3$$

$$x = \ln 6.3 - 3$$

$$x = -1.16$$

The population of a city is 250,000 and has been decreasing 2.3% each year. Find the number of years, to the nearest hundredth, until the population reaches 150,000.

$$100 - 2.3 = 97.7\%$$

$$\frac{250{,}000}{250{,}000}(.977)^x = \frac{150{,}000}{250{,}000}$$

$$(.977)^x = .6$$

$$\log_{.977}(.6) = x$$

$$\frac{\ln .6}{\ln .977} = x = 21.95$$

You invest $20,000 in an account that pays 7% annual interest. If interest is compounded continuously find the number of years, to the nearest hundredth, that it will take to end up with $500,000.

$$\frac{500{,}000}{20{,}000} = \frac{20{,}000}{20{,}000}e^{.07t}$$

$$25 = e^{.07t}$$

$$\frac{\ln 25}{.07} = \frac{.07t}{.07}$$

$$t = 45.98 \text{ yrs}$$

You can now finish Hwk #17

Practice Sheet: Solving equations using Logarithms

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Sec 8-4: Properties of Logarithms

From Page 454:

Properties **Properties of Logarithms**

For any positive numbers, M, N, and b, $b \neq 1$,

$\log_b MN = \log_b M + \log_b N$	**Product Property**
$\log_b \frac{M}{N} = \log_b M - \log_b N$	**Quotient Property**
$\log_b M^x = x \log_b M$	**Power Property**

Use the Properties of Logarithms to write each as a single logarithm:

1. $3\log_4 K + 2\log_4 Q$

$= \log_4 K^3 + \log_4 Q^2$

$= \log_4 K^3 Q^2$

2. $5\log R - 6\log X + \frac{1}{2}\log Y$

$= \log R^5 - \log X^6 + \log Y^{1/2}$

$= \log R^5 - \log X^6 + \log \sqrt{Y}$

$= \log \frac{R^5}{X^6} + \log \sqrt{Y}$

$= \log\left(\frac{R^5}{X^6} \cdot \sqrt{Y}\right)$ or $\log \frac{R^5\sqrt{Y}}{X^6}$