1. Solve for $x$, without using logarithms:
   
   (a) $e^x = \frac{1}{e^7}$
   
   $$e^x = e^{-7} \quad x = -7$$

   (b) $(2.4 \ 27) \ 27^x = 9^{x^2 + x}$

   $$\left(3^3\right)^x = \left(3^{1/2}\right)^{x^2 + x}$$

   $$3^x = \frac{3^{2x^2 + 2x}}{3} \quad 3x = 2x^2 + 2x$$

   $$2x^2 - x = 0 \quad (2x - 1)x = 0$$

   $$x = 0, \frac{1}{2}$$

2. (2.4 32) Graph $y = 4e^{-x^2/2} - 1$

3. (2.4 38) Suppose $26,000$ is borrowed for 4 years at 6% interest. Find the interest paid over this period if the interest is compounded as follows:

   (a) Annually

   $$\$26000 \left(1 + .06\right)^4 \approx \$32824$$

   (b) Quarterly

   $$\$26000 \left(1 + \frac{.06}{4}\right)^{4 \times 4} \approx \$32994$$

   (c) Continuously

   $$\$26000 e^{.06 \times 4} \approx \$33052$$
4. Evaluate the following, without using a calculator:

(a) \( \log_3 81 = x \)
\[ 3^x = 81 \quad \therefore \quad x = 4 \]

(b) \( \ln e^5 = x \)
\[ e^x = e^5 \quad \therefore \quad x = 5 \]

5. Solve for \( x \):

(a) \( (2.5 \ 51) \log_3(x-2) + \log_3(x+6) = 2 \)
\[ \log_3\left((x-2)(x+6)\right) = 2 \]
\[ (x-2)(x+6) = 3^2 \]
\[ x^2 + 4x - 12 = 9 \]
\[ x^2 + 4x - 21 = 0 \]
\[ (x+7)(x-3) = 0 \]
\[ x = -7 \quad \text{or} \quad x = 3 \]

(b) \( (2.5 \ 61) 3^{x+1} = 5^x \)
\[ \ln(3^{x+1}) = \ln(5^x) \]
\[ (x+1)\ln(3) = x \ln(5) \]
\[ x(\ln(5) - \ln(3)) = \ln(3) \]
\[ x = \frac{\ln(3)}{\ln(5) - \ln(3)} \approx 2.15 \]

6. (2.5 \ 76) Suppose $15,000 is invested in an account paying 7% per year, compounded annually. How many years are required for the compound amount to

(a) double?
\[ 2(15000) = 15000(1 + 0.07)^t \]
\[ 2 = 1.07^t \]

(b) triple?
\[ 3(15000) = 15000(1 + 0.07)^t \]
\[ 3 = 1.07^t \]

\[ t = \log_{1.07}(2) \approx 10.24 \text{ years} \]

\[ t = \log_{1.07}(3) \approx 16.24 \text{ years} \]