Name: _____

Solving Exponential & Logarithmic Functions

Exercise 1: Solve each equation for *x*. Give an exact answer where possible, and an answer to four decimal places otherwise.

1) $3^{2x-1} = 7$
2) $5 = 3^{2x+1}$
3) $2^{3x+1} = 5$
4) $\log_3(x^2 - 2x) = 1$
5) $\log_4(x+1) = 2$

Exercise 2: Solve each equation for *x*. Give an exact answer where possible, and an answer to four decimal places otherwise.

a) $2\ln x = 1$

b) $\ln(\ln x) = 1$

c) $e^{x^2-4} = 1$

d) $1000e^{0.05t} = 1{,}000{,}000$

e) $100e^{5x} = 4$

f) $36e^{5x} = 4$

g) $\ln(e^x - 2) = 3$

h) $2\ln x = \ln 2 + \ln(3x - 4)$

Exercise 3: Given the formula $pH = -\log[H^+]$, where $[H^+]$ is the concentration (in moles per liter) of hydrogen ions:

Cindy the saboteur wants to make the pool close so that she won't have to go to swimming practice tomorrow morning. For the pool to remain open, the pH level must be between 7.2 and 7.8. After adding her mixture to the pool, Cindy was able to get a concentration of hydrogen ions of 7.5×10^{-8} moles per liter. Did she succeed in making the pool unsafe enough to close?

Exercise 4: Given the formula for Richter Scale, $M = \log\left(\frac{A}{A_0}\right)$, where A is the measured intensity of the earthquake, A_0 is the reference intensity, and M is the Richter Scale reading, find the following:

Exercise 5: Nancy is a scientist who measured the intensity of an earthquake to be 121,000 times the reference intensity. If Nancy needs to report a Richter scale reading to Daniel, a newspaper reporter, what number should Nancy tell Daniel?

Exercise 6: A hotel finds that its total annual revenue and the number of rooms occupied daily by guests can best be modeled by the function $R = 3\log(n^2 + 10n),\ n > 0,$ where R is the total annual revenue, in millions of dollars, and n is the number of rooms occupied daily by guests. The hotel needs an annual revenue of \$12 million to be profitable. Graph the function on the accompanying grid over the interval $0 < n \le 100.$ Calculate the minimum number of rooms that must be occupied daily to be profitable.