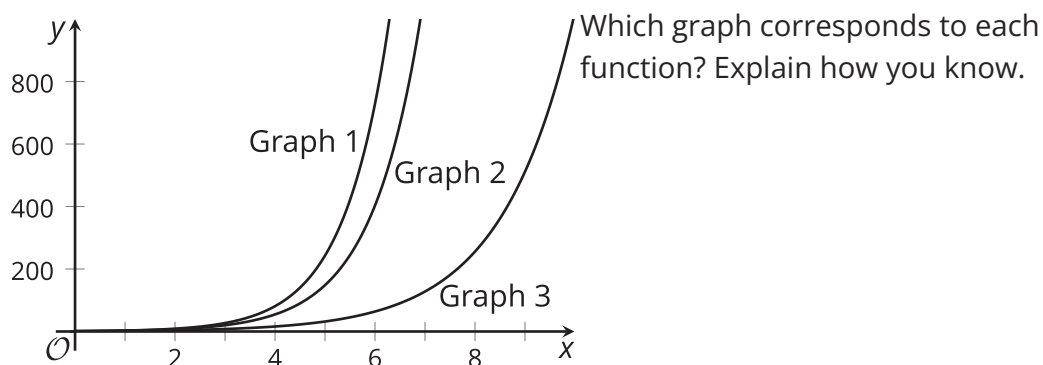# Lesson 12 Practice Problems

1. Put the following expressions in order from least to greatest.

   ○ e^3

   ○ 2^2

   ○ e^2

   ○ $2e$

   ○ e^e

2. Here are graphs of three functions: $f(x) = 2^x$, $g(x) = e^x$, and $h(x) = 3^x$.

Which graph corresponds to each function? Explain how you know.

3. Which of the statements are true about the function f given by $f(x) = 100 \cdot e^{-x}$? Select **all** that apply.

   A. The y-intercept of the graph of f is at $(0, 100)$.

   B. The values of f increase when x increases.

   C. The value of f when $x = -1$ is a little less than 40.

   D. The value of f when $x = 5$ is less than 1.

   E. The value of f is never 0.

4. Suppose you have $1 to put in an interest-bearing account for 1 year and are offered different options for interest rates and compounding frequencies (how often interest is calculated), as shown in the table. The highest interest rate is 100%, calculated once a year. The lower the interest rate, the more often it gets calculated.

a. Complete the table with expressions that represent the amount you will have after one year, and then evaluate each expression to find its value in dollars (round to 5 decimal places).

interest rate	frequency per year	expression	value in dollars after 1 year
100%	1	$1 \cdot (1 + 1)^1$	
10%	10	$1 \cdot (1 + 0.1)^{10}$	
5%	20	$1 \cdot (1 + 0.05)^{20}$	
1%	100		
0.5%	200		
0.1%	1,000		
0.01%	10,000		
0.001%	100,000		

b. Predict whether the account value will be greater than $3 if there is an option for a 0.0001% interest rate calculated 1 million times a year. Check your prediction.

c. What do you notice about the values of the account as the interest rate gets smaller and the frequency of compounding gets larger?

5. The function f is given by $f(x) = (1 + x)^{\frac{1}{x}}$. How do the values of f behave for small positive and large positive values of x?

6. Since 1992, the value of homes in a neighborhood has doubled every 16 years. The value of one home in the neighborhood was $136,500 in 1992.

    a. What is the value of this home, in dollars, in the year 2000? Explain your reasoning.

    b. Write an equation that represents the growth in housing value as a function of time in t years since 1992.

    c. Write an equation that represents the growth in housing value as a function of time in d decades since 1992.

    d. Use one of your equations to find the value of the home, in dollars, 1.5 decades after 1992.

    (From Unit 4, Lesson 4.)

7. Write two equations—one in exponential form and one in logarithmic form—to represent each question. Use "?" for the unknown value.

   a. "To what exponent do we raise the number 5 to get 625?"

   b. "What is the log, base 3, of 27?"

   (From Unit 4, Lesson 10.)

8. Clare says that $\log 0.1 = -1$. Kiran says that $\log(-10) = -1$. Do you agree with either one of them? Explain your reasoning.

   (From Unit 4, Lesson 11.)