PreCalculus **Chapter 3 Review**

1. Graph $f(x) = 3^x$

2. After t years, the value of a car that cost \$20,000 is given by $V(t) = 20{,}000\left(\frac{3}{4}\right)^t$. Determine the value of the car after 5 years.

3. \$3500 is invested at a rate of $4\frac{1}{2}\%$ for 12 years. How much money would be in the account if it was compounded:

(a) quarterly

(b) continuously

4. Write in exponential form: $\log_b 16 = 2$

5. Write in logarithmic form: $8^3 = 512$

6. Find the domain of the function: $f(x) = 3\log(5x - 2)$

7. Write as a sum, difference, or multiple of logarithms: $\log_2 \sqrt{\frac{x^2}{y}}$.

8. Write as the logarithm of a single quantity: $\frac{1}{3}\log_b 27 - 2\log_b 3 + \log_b 8$.

9. Simplify: $\ln\sqrt{e^3}$

Solve the exponential equation algebraically.

10. $7 - 2e^x = 5$

11. $5^{2x} = 625$

Solve the logarithmic equation.

12. $\log(x+4) - \log x = \log(x+2)$

Students participating in a psychological experiment attended several lectures and were given an exam. Every month for a year after the exam, the students were retested to see how much of the material they remembered. The average scores for the group are given by the memory model $f(t) = 90 - 15\log(t+1),\ 0 \le t \le 12$ where t is the time in months.

13. What was the average score on the original exam (t=0)?
14. What was the average score after 6 months?
15. What was the average score after 12 months?
16. When will the average score decrease to 75?

17. The population P of a city is given by $P = 240{,}360e^{0.012t}$ where t = 0 represents 1990. According to this model, when will the population reach 275,000?

18. A bottle of spring water with an initial temperature of 72°F is placed in a freezer with a temperature of 28°F. After 15 minutes, the temperature of the water drops to 50°F. Use, $T_f = T_r + (T_o - T_r)e^{-rt}$, where T_f is the final temperature of the object after t minutes, T_r is the temperature of the surrounding air, T_o is the original temperature of the object, and r is the rate at which the object is cooling, to find the rate of cooling, r, and then determine how long it will take the water to reach 32°F.