Practice Problems for Math Success

Exponential Functions

These **practice problems** are designed to help you **prepare for our course exams** and **assess your understanding** of the course material at the expected level. Aim to complete them **in class, during tutoring, office hours, or on your own**, and try to solve them **without notes or a calculator**, just like on the **actual exams**. Remember, **practice makes perfect**, so don't hesitate to **ask for help** if you get stuck.

1. Some values of the function $f(x)$ are given in the table below.

x	$f(x)$
-1	-54
2	k
3	$-\frac{2}{3}$

Find the value of k if

(a) $f(x)$ is linear.

(b) $f(x)$ is exponential.

2. A population of 25 turtles of an endangered species is released into a nature preserve. After 7 years the population has grown to 172 turtles.

   (a) Suppose the growth is linear. Find a formula for the population after t years.

   (b) Suppose the growth is exponential. Find a formula for the population after t years.

3. A typical cup of coffee contains about 100 mg of caffeine and every hour 16% of the amount of caffeine in the body is metabolized and eliminated.

   (a) Let C represent the amount of caffeine in the body (in mg) and t represent the number of hours since a cup of coffee was consumed. Write C as a function of t.

   (b) How much caffeine is in the body after 5 hours?

4. The atmospheric pressure is decreasing as you climb higher and higher. The Earth's atmospheric pressure is 1013 millibars at sea level, and 750 millibars 2 kilometers above sea level. Suppose the atmospheric pressure decreases exponentially with the elevation above sea level. What is the atmospheric pressure at 5 km above sea level?

5. Assume that $f(x) = 4 \cdot 8^x$ and that $g(x) = 2^x$.

   (a) If $f(x) = h(g(x))$, find a formula for $h(x)$.

   (b) If $f(x) = g(j(x))$, find a formula for $j(x)$.