**Homework** (Topic 2.11) Logarithmic Functions Name: Pd:

**Directions**: Write limit statements for the end behavior of the following logarithmic functions. Hint: Draw a picture to help

1. $f(x) = 3\log_2 x$

Left: _____

Right: _____

2. $g(x) = -2\log x$

Left: _____

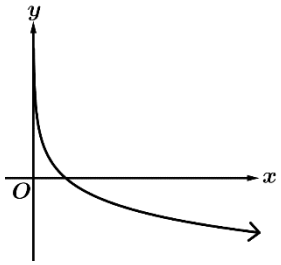
Right: _____

3. $h(x) = \frac{3}{4} \ln(x-2)$

Left: _____

Right: _____

**Directions**: The graphs of $k$ and $m$ are shown below. Use the graphs to answer the following.



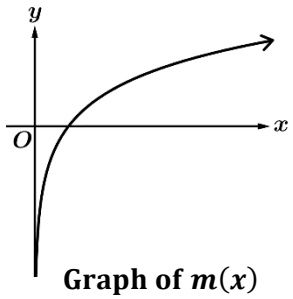

**Graph of $k(x)$**

4. The graph of $k$ is
(A) increasing at an increasing rate.
(B) increasing at a decreasing rate.
(C) decreasing at an increasing rate.
(D) decreasing at a decreasing rate.

5. Which of the following pairs of limit statements correctly describes the end behavior of $k$?
(A) $\lim_{x\to 0^+} k(x) = -\infty$ and $\lim_{x\to\infty} k(x) = -\infty$
(B) $\lim_{x\to 0^+} k(x) = -\infty$ and $\lim_{x\to\infty} k(x) = \infty$
(C) $\lim_{x\to 0^+} k(x) = \infty$ and $\lim_{x\to\infty} k(x) = -\infty$
(D) $\lim_{x\to 0^+} k(x) = \infty$ and $\lim_{x\to\infty} k(x) = \infty$

6. Which of the following could be the equation for $k$?
(A) $k(x) = -2\log_4 x$ (B) $k(x) = 2\log_4 x$
(C) $k(x) = -4(2)^x$ (D) $k(x) = 4\left(\frac{1}{2}\right)^x$

7. Which of the following equations could be $k^{-1}$?
(A) $k^{-1}(x) = \left(\frac{1}{2}\right)^x$ (B) $k^{-1}(x) = -(2)^x$
(C) $k^{-1}(x) = \frac{-1}{2\log_4 x}$ (D) $k^{-1}(x) = -2\log_4 x$




**Graph of $m(x)$**

8. The graph of $m$ is
(A) increasing at an increasing rate.
(B) increasing at a decreasing rate.
(C) decreasing at an increasing rate.
(D) decreasing at a decreasing rate.

9. Which of the following pairs of limit statements correctly describes the end behavior of $m$?
(A) $\lim_{x\to 0^+} m(x) = -\infty$ and $\lim_{x\to\infty} m(x) = -\infty$
(B) $\lim_{x\to 0^+} m(x) = -\infty$ and $\lim_{x\to\infty} m(x) = \infty$
(C) $\lim_{x\to 0^+} m(x) = \infty$ and $\lim_{x\to\infty} m(x) = -\infty$
(D) $\lim_{x\to 0^+} m(x) = \infty$ and $\lim_{x\to\infty} m(x) = \infty$

10. Which of the following could be the equation for $m$?
(A) $m(x) = -3\log_8 x$ (B) $m(x) = 3\log_8 x$
(C) $m(x) = -3(8)^x$ (D) $m(x) = 3(8)^x$

11. Which of the following equations could be $m^{-1}$?
(A) $m^{-1}(x) = \left(\frac{1}{2}\right)^x$ (B) $m^{-1}(x) = -(2)^x$
(C) $m^{-1}(x) = 2^x$ (D) $m^{-1}(x) = \frac{1}{3\log_8 x}$

**Directions:** Selected values of the several logarithmic functions are shown in the tables below. For each table, find the value of the constant $k$.

12.

| $x$ | $f(x)$ |
|---|---|
| 0.3 | 2 |
| 3 | 5 |
| 30 | 8 |
| $k$ | 11 |
| 3000 | 14 |

13.

| $x$ | $g(x)$ |
|---|---|
| $\frac{3}{4}$ | 1 |
| 3 | 2 |
| $k$ | 3 |
| 48 | 4 |

14.

| $x$ | $h(x)$ |
|---|---|
| $12k$ | $k-1$ |
| $6k$ | $k$ |
| $3k$ | $k+1$ |
| 6 | $k+2$ |
| 3 | $k+3$ |

15.

| $x$ | $l(x)$ |
|---|---|
| $3^7$ | 4 |
| $3^5$ | 6 |
| 27 | 8 |
| 3 | 10 |
| $k$ | 12 |

16) Which of the following functions could have the following end behavior?

$x \to 10^-, f(x) \to \infty$

$x \to -\infty, f(x) \to -\infty$

(A) $f(x) = -3\ln(x-10)+5$

(B) $g(x) = -2\log(5-x)+10$

(C) $h(x) = -log_3(10-x)-5$

(D) $j(x) = \log(10-x)+4$

17) Let $f(x) = 3\log_5(x+4)$.

Find the domain and range of the function $f$

18) For each function, identify the parent function and describe the transformations that occurred.

a. $f(x) = \log_6(x-2)$

b. $g(x) = -\log_3 x + 5$

c. $h(x) = \ln\left(\frac{x}{3}\right)$