

### 4.3 In-class Practice

1. Change the equation from logarithmic to exponential or from exponential to logarithmic form.

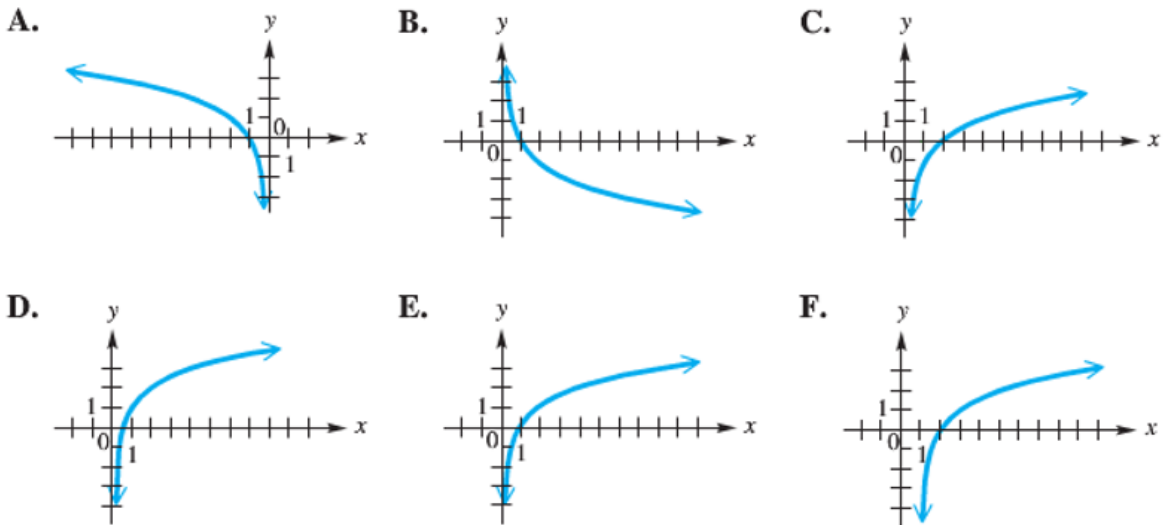
- a)  $3^4 = 81$                       b)  $4^{\frac{3}{2}} = 8$                       c)  $10^{-4} = 0.0001$   
 d)  $\log_6 36 = 2$                       e)  $\log_{\sqrt{3}} 81 = 8$                       f)  $\log_4 \frac{1}{64} = -3$

2. **Concept Check** In Exercises 1 and 2, match the logarithm in Column I with its value in Column II. Remember that  $\log_a x$  is the exponent to which  $a$  must be raised in order to obtain  $x$ .

I	II	I	II
1. (a) $\log_2 16$	A. 0	2. (a) $\log_3 81$	A. -2
(b) $\log_3 1$	B. $\frac{1}{2}$	(b) $\log_3 \frac{1}{3}$	B. -1
(c) $\log_{10} 0.1$	C. 4	(c) $\log_{10} 0.01$	C. 0
(d) $\log_2 \sqrt{2}$	D. -3	(d) $\log_6 \sqrt{6}$	D. $\frac{1}{2}$
(e) $\log_e \frac{1}{e^2}$	E. -1	(e) $\log_e 1$	E. $\frac{9}{2}$
(f) $\log_{1/2} 8$	F. -2	(f) $\log_3 27^{3/2}$	F. 4

3. Match the logarithmic function with its graph.

- a)  $f(x) = \log_2 x$                       b)  $f(x) = \log_2 2x$                       c)  $f(x) = \log_2 \frac{1}{x}$   
 d)  $f(x) = \log_2 \left(\frac{1}{2}x\right)$                       e)  $f(x) = \log_2(x - 1)$                       f)  $f(x) = \log_2(-x)$



4. Graph the function by transforming the graph of a basic logarithmic function. Then state the domain, range and the equation of asymptote of the given function.

- a)  $f(x) = 2\log_2(x + 1)$                       b)  $f(x) = \log_2(x - 4) + 2$   
 c)  $f(x) = -\log_2(-x)$                       d)  $f(x) = -\log_2\left(\frac{1}{2}x\right)$   
 e)  $f(x) = \ln|x|$                       f)  $f(x) = |\ln|x||$

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5. Find the domain of the function.

a)  $f(x) = \log(8 - 2x)$

b)  $g(x) = \log_5(x - x^2)$

c)  $h(x) = \ln x + \ln(2 - x)$

d)  $s(x) = \sqrt{x - 2} - \log_5(10 - x)$

6. **Carbon Dating** The age of an ancient artifact can be determined by the amount of radioactive carbon-14 remaining in it. If  $D_0$  is the original amount of carbon-14 and  $D$  is the amount remaining, then the artifact's age  $A$  (in years) is given by

$$A = -8267 \ln\left(\frac{D}{D_0}\right)$$

Find the age of an object if the amount  $D$  of carbon-14 that remains in the object is 73% of the original amount  $D_0$ .