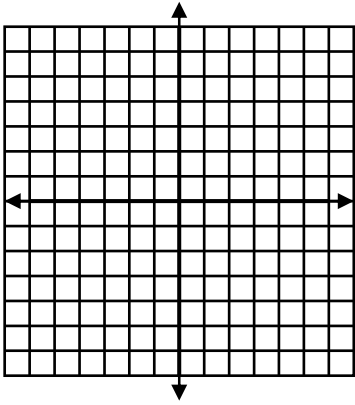


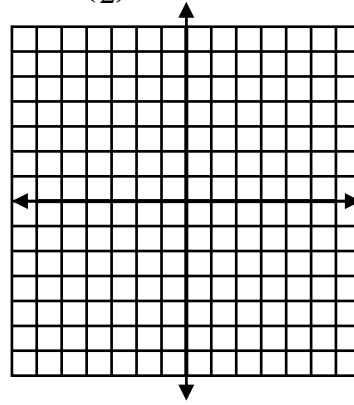
**I. Exponential Function**     $f(x) = b^x ; x \in \mathbb{R}, b \in \mathbb{R}^+, y \in \mathbb{R}^+$

1) Sketch:

(a)  $y = e^x$



(b)  $y = \left(\frac{1}{2}\right)^x$



2) Evaluate using a calculator:

(a)  $2^{\sqrt{3}} =$  \_\_\_\_\_

(b)  $e^{\sqrt{6}} =$  \_\_\_\_\_

(c)  $5^{-\sqrt[3]{2}} =$  \_\_\_\_\_

3) Without using your calculator, simplify completely:

(a)  $\left(4^{\sqrt{3}}\right)^{\sqrt{2}} =$  \_\_\_\_\_

(b)  $8^{\sqrt{6}} 4^{\sqrt{54}} =$  \_\_\_\_\_

4) Without using your calculator, solve for “n” in the following exponential equations.

(a)  $3^5 = 3^{2n-1}$

(b)  $9^{3n} = 27^{n-2}$

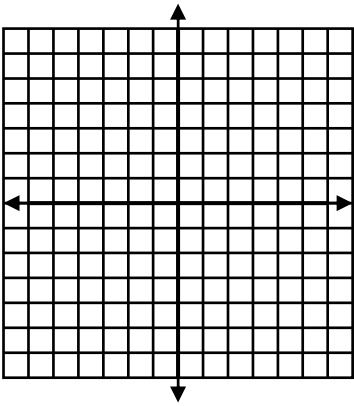
(c)  $36^n = 6^{n^2-3}$

**II. Logarithmic Functions:**  $\log_B A = C \Leftrightarrow B^C = A$

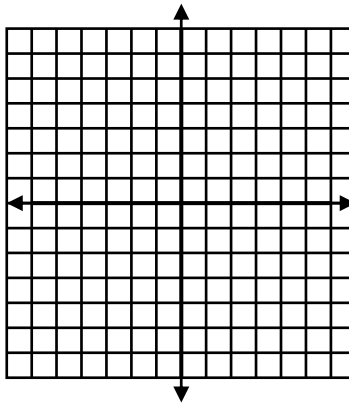
Natural logs:  $\ln A = C \Leftrightarrow e^C = A$

Common logs:  $\log A = C \Leftrightarrow 10^C = A$

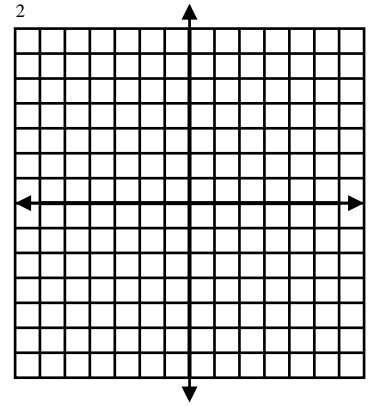
5) Sketch: (a)  $y = \log_5 x$



(b)  $y = \ln x$



(c)  $y = \log_{\frac{1}{2}} x$



6) Without using your calculator, solve the following log equations for x:

(a)  $x = \log_2 64$

(b)  $\log_{\frac{1}{3}} 27 = x$

(c)  $\log_7 \frac{1}{49} = x$

(d)  $\log_2 \sqrt{2} = x$

(e)  $\log_2 x = 5$

(f)  $\log_x \frac{1}{25} = -2$

(g)  $\log_9 x = -1$

(h)  $\log_x \sqrt[3]{7} = \frac{1}{3}$

(i)  $\log_4 4 = x$

(j)  $\log 1000 = x$

(k)  $\log 0.01 = x$

(l)  $\ln x = 0$

(m)  $\ln \sqrt{e} = x$

(n)  $\ln x = 4$

(o)  $\ln e^5 = x$

### III. Log Properties:

$$\left\{ \begin{array}{l} (1) \log_c A + \log_c B = \log_c (AB) \\ (2) \log_c A - \log_c B = \log_c \left( \frac{A}{B} \right) \\ (3) P \log_B A = \log_B A^P \\ (4) \log_B A = \frac{\log_c A}{\log_c B} \end{array} \right.$$

7) Using log properties, write each expression as a single log.

(a)  $\log 15 - \log 3 =$  \_\_\_\_\_

(b)  $\log 4 + \log 2 =$  \_\_\_\_\_

(c)  $3 \log 2 - \log 4 =$  \_\_\_\_\_

(d)  $2 \log 6 - 2 \log 3 =$  \_\_\_\_\_

8) Using log properties, express each log in terms of A and B given:  $A = \log 7$ ,  $B = \log 3$ .

(a)  $\log 21 =$  \_\_\_\_\_

(b)  $\log \left( \frac{7}{3} \right) =$  \_\_\_\_\_

(c)  $\log 27 =$  \_\_\_\_\_

(d)  $\log 49 =$  \_\_\_\_\_

(e)  $\log \left( \frac{1}{3} \right) =$  \_\_\_\_\_

(f)  $\log \left( \frac{7}{9} \right) =$  \_\_\_\_\_

9) Solve each log equation using log properties:

(a)  $\log_3(2x+1) = \log_3(3x-6)$

(b)  $\log_3 56 - \log_3 8 = \log_3 x$

(c)  $\log_3(x+4) + \log_3(x-2) = 3$

(d)  $\ln 2 + \ln 7 = \ln x$

(e)  $\log_8(m+1) - \log_8 m = \log_8 4$

(f)  $2 \log_7 3 + 3 \log_7 2 = \log_7 x$

10) Use your calculator to find an approximate value of x:

(a)  $\log_5 4 = x$

(b)  $\log_3 5 = x$

(c)  $7^x = 20$

(d)  $3^{x+2} = 5$

(e)  $x = 1000e^{(5)(.06)}$

(f)  $800 = 400e^{.0875x}$

11) Solve:  $4^{2x-5} = 3^x$  using your graphing calculator and tracing.  $x = \underline{\hspace{2cm}}$

**IV. Property:**  $B^{\log_B N} = N$

12) Evaluate without using your calculator:

(a)  $e^{\ln 5} = \underline{\hspace{2cm}}$

(b)  $e^{2\ln 5} = \underline{\hspace{2cm}}$

(c)  $4^{\log_4 2 + \log_4 3} = \underline{\hspace{2cm}}$

(d)  $10^{\log 20 - \log 2} = \underline{\hspace{2cm}}$