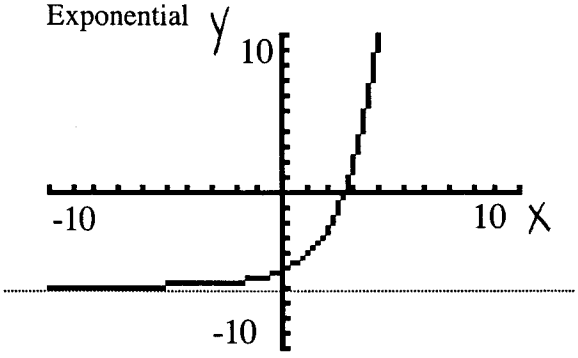
Math 1111 Sample Test 4 Name Solutions

5.1 - 5.4 Date _____

Sample Test 5

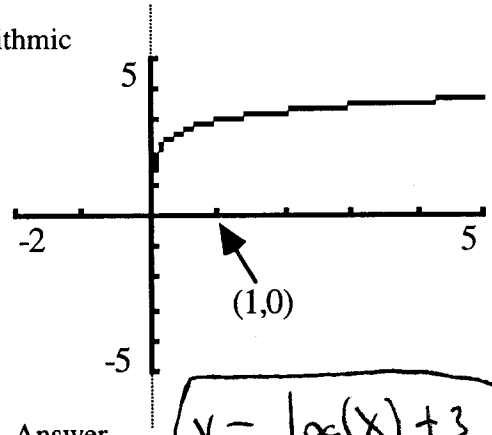
Use stretching/shrinking, reflecting and shifting rules to give an equation of the following graphs. Note: there may be more than one answer for these.

1. Exponential



Answer $y = 2^x - 6$ ✓

2. Logarithmic



Answer $y = \log(x) + 3$ ✓

Rewrite the logarithm in terms of ln 2 and ln 7.

3. $\ln 14 = \ln(2 \cdot 7)$

$= \ln 2 + \ln 7$ ✓

4. $\ln \frac{2}{49} = \ln 2 - \ln 49$

$= \ln 2 - \ln 7^2$

$= \ln 2 - 2\ln 7$ ✓

Rewrite using the properties of logarithms.

5. $\log_2 \frac{\sqrt{a-1}}{9}$

$= \log_2 \sqrt{a-1} - \log_2 9$

$= \log_2 (a-1)^{\frac{1}{2}} - \log_2 3^2$

$= \frac{1}{2}\log_2 (a-1) - 2\log_2 3$ ✓

6. $\ln xyz^2 = \ln x + \ln y + \ln z^2$

$= \ln_e x + \ln_e y + 2\ln_e z$ ✓

Solve the following exponential or logarithmic equations. SHOW YOUR WORK !
You can check your answers with your calculator. Don't forget some of these have answers that have to be checked !

7. $\left(\frac{1}{3}\right)^x = 81$

$\Rightarrow (3^{-1})^x = 3^4$

$\Rightarrow 3^{-x} = 3^4$

$-x = 4$

$x = -4$ ✓

8. $\log_4 x = 3$

$4^3 = x$

$x = 64$ ✓

9. $\left(\frac{3}{2}\right)^{x+1} = \left(\frac{8}{27}\right)^x$

$\left(\frac{3}{2}\right)^{x+1} = \left(\frac{2}{3}\right)^{3x}$

$\left(\frac{3}{2}\right)^{x+1} = \left(\frac{3}{2}\right)^{-3x}$

$x+1 = -3x$

$1 = -4x$

$x = -\frac{1}{4}$ ✓

10. $8^x = 42$

$\ln 8^x = \ln 42$

$\frac{x \ln 8}{\ln 8} = \frac{\ln 42}{\ln 8}$

$x = \frac{\ln 42}{\ln 8}$ ✓

or

$\log 8^x = \log 42$

$\frac{x \log 8}{\log 8} = \frac{\log 42}{\log 8}$

$x = \frac{\log 42}{\log 8}$ ✓

11. $\log_2 \frac{1}{8} = x$

$\log_2 \frac{1}{2^3} = x$

$\log_2 2^{-3} = x$

$-3 = x$ ✓

or

$\log_2 \frac{1}{8} = x$

$2^x = \frac{1}{8}$

$2^x = \frac{1}{2^3}$

$2^x = 2^{-3}$

$x = -3$ ✓

12. $\ln 3x = 4$

$\ln_e 3x = 4$

$e^4 = 3x$

$\frac{e^4}{3} = \frac{3x}{3}$

$x = \frac{e^4}{3}$ ✓

Evaluate the following expressions with your calculator. Round to three decimal places.

13. $e^{\pi} =$ 23.141 ✓

14. $\log_5 117 =$ 2.959

Describe the transformation that occurs in the function. Remember to find the basic function first. Also sketch the graph.

15. $y = -\log_7(x-2) - 3$

$y = \log_a x$ ← basic graph →

Description: reflects over x axis
shifts right 2
and down 3

See Answer Key

16. $y = -5^{x+3}$

$y = a^x$

Description: reflect over x axis
shifts left 3

See Answer Key

17. A total of \$16,500 is invested at an annual interest rate of 7%. Find the balance after 8 years if it is compounded monthly.

$A = P\left(1 + \frac{r}{n}\right)^{nt}$

$= 16500\left(1 + \frac{.07}{12}\right)^{12 \cdot 8}$

$A = \$28839.14$ ✓

from calculator

$A = ?$
$P = 16500$
$n = 12$
$r = .07$
$t = 8$

18. A total of \$12,500 is invested at an annual interest rate of 11%. Find the balance after 5 years if it is compounded continuously.

$A = Pe^{rt}$

$= 12500e^{(.11)(5)}$

$= \$21665.66$ ✓

$A = ?$
$P = 12500$
$r = .11$
$t = 5$

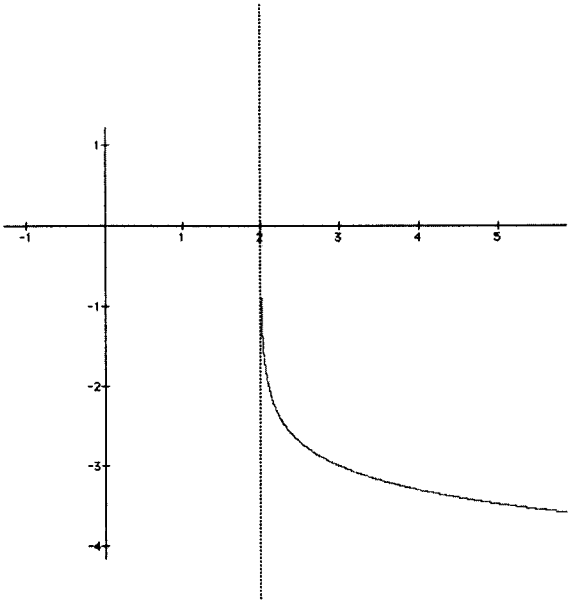
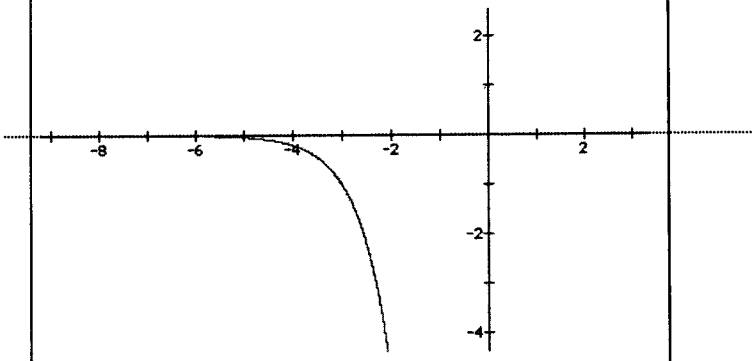
use calculator

19) $3^e = 3^{\wedge e^1} = 19.81299075$ ✓

20) $\log_7 7^{(x+1)} = x+1$ ✓

from property $\log_a a^x = x$

Sample Test 5 Answers

1) $y = 2^x - 6$	2) $y = \log(x) + 3$
3) $\ln 2 + \ln 7$	4) $\ln 2 - 2\ln 7$
5) $\frac{1}{2}\log_2(a-1) - 2\log_2 3$	6) $\ln x + \ln y + 2\ln z$
7) $x = -4$	8) $x = 64$
9) $x = \frac{-1}{4}$	10) $x = \frac{\ln 42}{\ln 8}$
11) $x = -3$	12) $x = \frac{e^4}{3}$
13) 23.141	14) 2.959
15) Reflect over x axis shift right 2 and down 3. 	16) reflect over x axis shift left 3. 
17) $ 28839.14	18) $ 21665.66
19) 19.81299075...	20) x +1