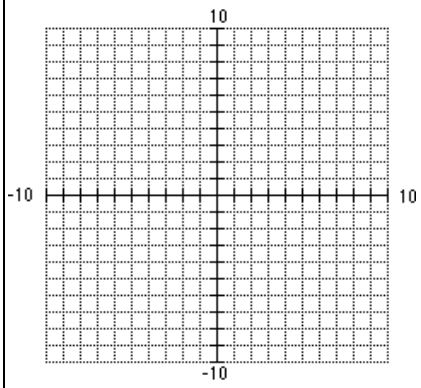
Algebra 2 Trigonometry Unit 6 Test Review **Name** _____
Exponential and Logarithmic Functions **Date** _____ **Block** _____

- *There will be two parts to the test: A NON-CALCULATOR portion and a CALCULATOR portion!*
- *Know how to graph exponential functions and logarithmic functions. Be able to determine the domain and range, the y-intercept, and the equations of the asymptotes of these functions.*

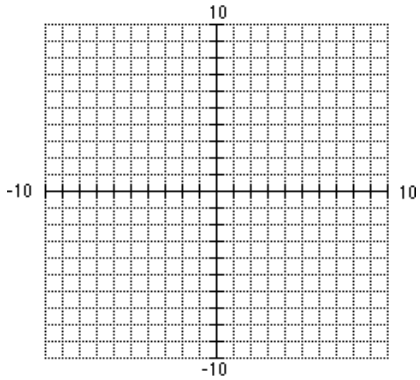
Graph each function without a calculator. State the y-intercept, the domain and range using interval notation, and the equation of the asymptote.

1. $y = 3^x$



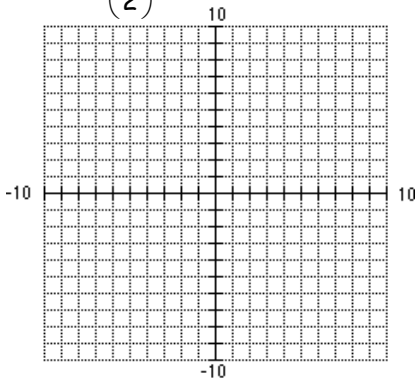
Asymptote: _____
y-intercept: _____
Domain: _____
Range: _____

2. $y = -2(3)^x - 2$



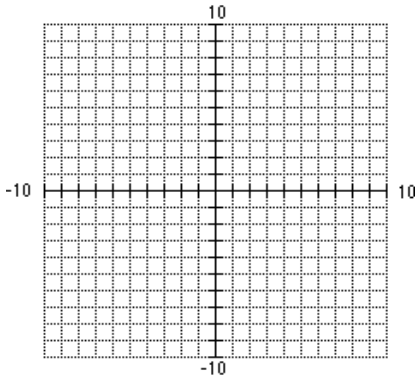
Asymptote: _____
y-intercept: _____
Domain: _____
Range: _____

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



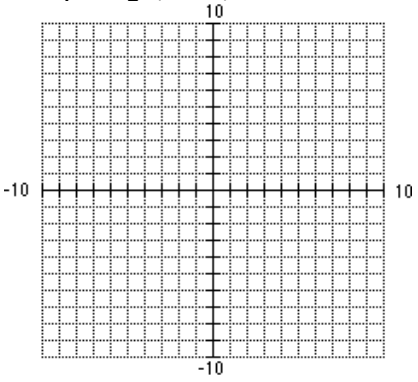
Asymptote: _____
y-intercept: _____
Domain: _____
Range: _____

4. $y = \log_3 x$



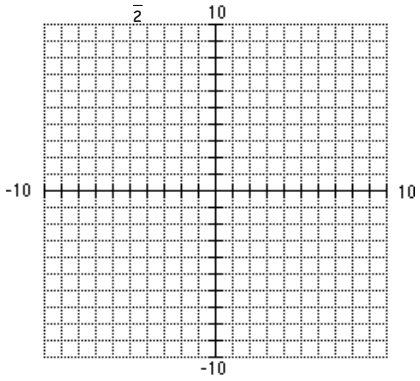
Asymptote: _____
y-intercept: _____
Domain: _____
Range: _____

5. $y = \log_2(x + 5)$



Asymptote: _____
y-intercept: _____
Domain: _____
Range: _____

6. $y = \log_{\frac{1}{2}} x$



Asymptote: _____
y-intercept: _____
Domain: _____
Range: _____

- *Know how to determine whether a function is a growth or decay function.*

State whether the function represents exponential growth or exponential decay. (NO calculator)

7. $f(x) = 5\left(\frac{3}{4}\right)^x$	**8.** $f(x) = 2e^x$	**9.** $f(x) = 3(6)^{-x}$	**10.** $f(x) = 4(3)^x$	**11.** $f(x) = 2e^{-3x}$

♦ *Know how to change an expression from exponential form to logarithmic form and vice versa.*

Rewrite each equation in exponential form. (NO calculator)			
12. $\log_5 \frac{1}{5} = -1$	**13.** $\log_8 512 = 3$	**14.** $\log_{14} 196 = 2$	**15.** $\log_{105} 11{,}025 = 2$
Rewrite each equation in logarithmic form. (NO calculator)			
16. $2^5 = 32$	**17.** $10^{-1} = 0.1$	**18.** $\left(\frac{1}{2}\right)^{-1} = 2$	**19.** $36^{-\frac{1}{2}} = \frac{1}{6}$

Know how to simplify a logarithm without a calculator.

Evaluate each expression without using a calculator.			
20. $\log_2 16$	**21.** $\log_5 25$	**22.** $\log_{11} 1$	**23.** $\log_{\frac{1}{4}} 2$
24. $\log_3 3^{-2.27}$	**25.** $\log_7 343$	**26.** $\log_{29} 29$	**27.** $\log_9 9^3$

♦ *Know how to find the inverse of a function. (Remember that a logarithmic function is the inverse of an exponential function).*

Find the inverse of each function. (NO calculator)		
28. $f(x) = \log_{\frac{1}{3}} x$	**29.** $y = \ln (x - 3)$	**30.** $f(x) = 7^x$

♦ *Know how to expand and condense a logarithmic expression. KNOW THE PROPERTIES!*

Expand each expression. (NO calculator)			
31. $\log_3 9x$	**32.** $\log 3x^4$	**33.** $\log_6 x^5$	**34.** $\ln 15x$
35. $\log_7 49x^2$	**36.** $\log \sqrt{9x}$	**37.** $\ln x^{\frac{1}{3}} y^4$	**38.** $\log x^2 y^3 z^4$

Condense each expression. (NO calculator)		
39. $\log_4 7 + \log_4 10 - \log_4 2$	**40.** $4 \ln x + 6 \ln y + 3 \ln z$	**41.** $5\log_4 3 + 6\log_4 x + 7\log_4 y$
42. $\frac{1}{4}(\ln 9 - \ln x) + \frac{1}{4} \ln 3$	**43.** $3(\log_5 10 - \log_5 2) + \frac{1}{2} \log_5 \frac{1}{100}$	

♦ *Know how to evaluate an expression by applying the properties of logarithms.*

Use a property of logarithms to evaluate each expression. (NO calculator)			
44. $\log_2 (4 \cdot 8)$	**45.** $\ln e^3$	**46.** $\log_2 8^2$	**47.** $\log_6 216$
48. $\log \frac{1}{100}$	**49.** $\ln \frac{1}{e^5}$	**50.** $\log 0.001$	**51.** $\log_3 27^2$

♦ *Know how to evaluate an expression using the CHANGE-OF-BASE FORMULA.*

Use the change-of-base formula to evaluate each expression. (May use calculator)		
52. $\log_6 24$	**53.** $\log_9 \frac{5}{16}$	**54.** $\log_2 12$

♦ *Know how to solve a logarithmic or exponential equation.*

Solve each equation. Check for extraneous solutions. (May use calculator)		
55. $4.7^x = 32$	**56.** $4^x - 3 = 11$	**57.** $3^{x+2} = 9^{x+1}$
58. $\log_5 (2x + 10) = \log_5 4x$	**59.** $\ln (5 - x) = 12$	**60.** $\log_2 x + \log_2 (x + 4) = 5$
61. $\ln 8x = 4$	**62.** $9000 = 500(1.065)^x$	**63.** $3^{x-2} = 5^{2x}$

- *Know how to solve a growth problem.* $y = a(1 + r)^t$ *Know what is meant by "growth factor".*
- *Know how to solve a decay problem.* $y = a(1 - r)^t$ *Know what is meant by "decay factor".*
- *Know how to calculate compounded interest:* $A = P\left(1 + \frac{r}{n}\right)^{nt}$ *& continuously compounded interest:* $A = Pe^{rt}$

Solve each problem. (May use a calculator)

64. Carl plans to invest $500 at 8.25% interest, compounded continuously. How long will it take for his money to triple?

65. A piece of machinery valued at $250,000 depreciates at a steady rate of 12% per year. After how many years will the value have depreciated to $100,000?

66. Ray invested $10,000 in an account which yields 4.5% interest compounded monthly. Assuming no deposits or withdrawals are made, what will the balance of the account be after 5 years?

67. Dave bought a new car 8 years ago for $5400. To buy a new car comparably equipped now would cost $12,500. Assuming a steady rate of increase, what was the yearly rate of inflation in car prices over the 8 year period?

68. An organism of a certain type can grow continuously from 30 to 195 organisms in 5 hours. Find k, the rate of continuous growth, for the growth formula ($y = ne^{kt}$).

69. An equation for loudness L in decibels is given by $L = 10\log R$, where R is the sound's relative intensity. An air-raid siren can reach 150 decibels and jet engine noise can reach 120 decibels. How many times greater is the relative intensity of the air-raid siren than that of the jet engine noise?