Honors Algebra 2 Name______________________
Chapter 4 Review Block___________

Non-calculator

1. Simplify using the properties of exponents. Leave answers as fractions where applicable. (Rev of Exp)

a) $(81^{\frac{5}{2}})^{\frac{1}{5}}$ b) $3^{\frac{1}{7}} \cdot 27^{\frac{-2}{14}}$ c). $\dfrac{36^{\frac{3}{4}}}{6^{\frac{1}{4}}}$ d). $4^{\frac{-13}{4}} \cdot 4^{\frac{1}{5}}$

e) $\left(\dfrac{1}{125}\right)^{\frac{2}{3}}$ f) $\left(4^{12}\right)^{\frac{1}{3}}$ g) $16^{-\frac{3}{4}}$ h) $\dfrac{a^{\frac{7}{3}}}{a^{\frac{5}{2}}}$

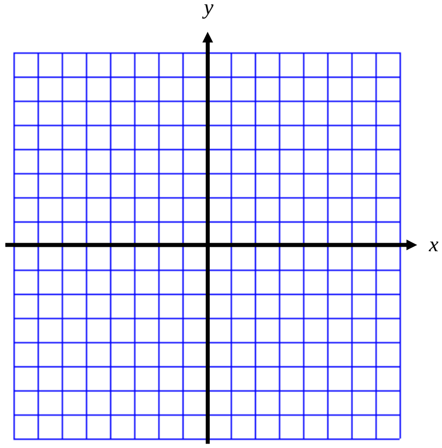
2. A population of 500 bacteria increases at a rate of 25% per minute. (4-1)

a. Write an equation and sketch a graph (by hand) to model this situation. List what each variable stands for.

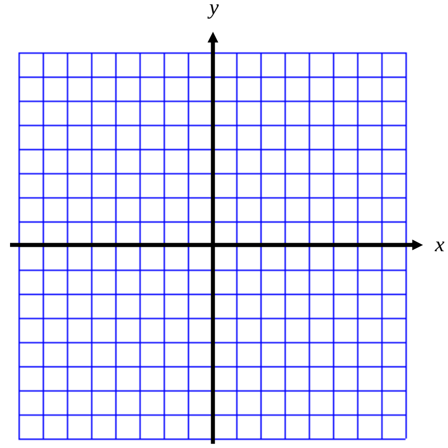
b. Tell whether this equation represents exponential growth, linear growth, or neither.

3. For each function: (4-2 parts a & b; 4-3 parts c & d)
i) Graph the function and its inverse in the same coordinate plane.
ii) Find an equation for $f^{-1}(x)$

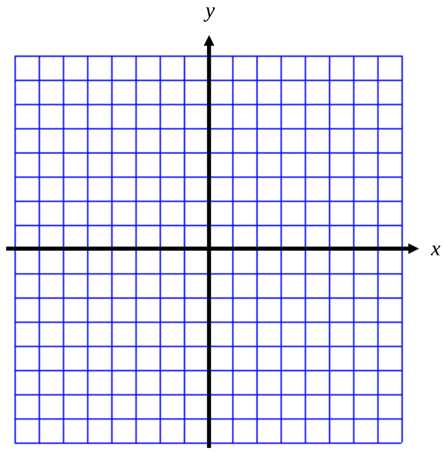
a) $f(x) = -\dfrac{1}{2}x$



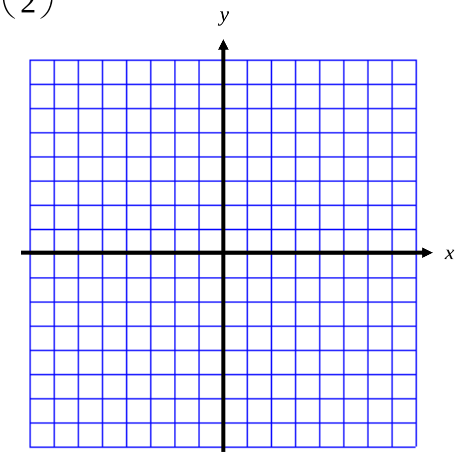
b) $f(x) = 2x - 5$



c) $f(x) = 3^x$



d) $f(x) = 4\left(\frac{1}{2}\right)^x$



4. Write each equation in logarithmic form. (4-3)

a) $2^5 = 32$

b) $4^{-\frac{1}{2}} = \frac{1}{2}$

c) $(0.5)^3 = 0.125$

5. Write each equation in exponential form. (4-3)

a) $\ln 148.41 \approx 5$

b) $\log_{\frac{1}{2}} 32 = -5$

c) $\log_{\frac{1}{25}} 125 = -\frac{3}{2}$

6. Evaluate each logarithm. (4-3)

a) $\log_6 36$

b) $\log_{27} 3$

c) $\ln e^4$

d) $\log 10^{0.1x}$

d) $\log_4 1$

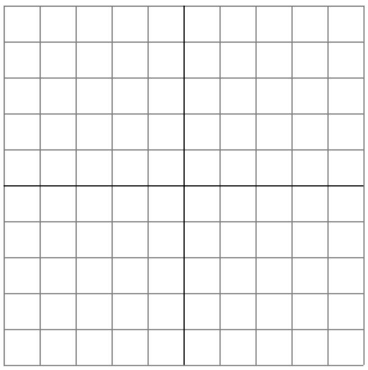
e) $\log_{1.5} 2.25$

f) $\log_{81} \frac{1}{3}$

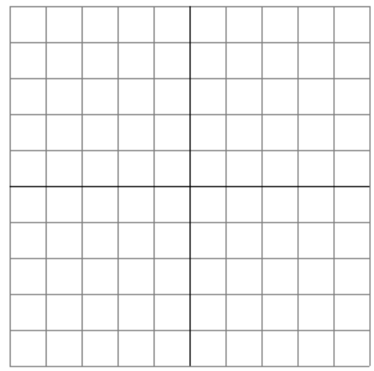
g) $\ln e^{-2}$

7. Identify the parent function and describe how it was transformed into the given function. Determine the asymptote. Graph the function by hand including 2 key points and a dashed line for the asymptote. (4-7)

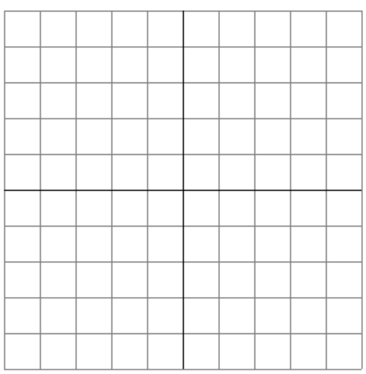
a) $g(x) = 0.5(3)^x - 2$



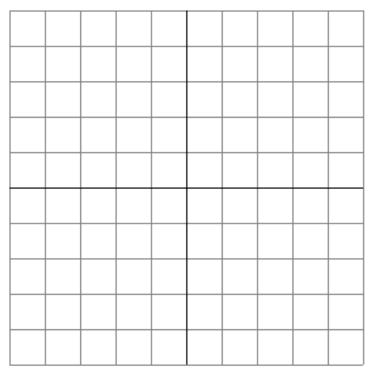
b) $h(x) = -e^{x-2}$



c) $g(x) = 5\log_3(x-2) - 3$



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



8. Rewrite the function given the transformation(s) below. (4-7)

a) $f(x) = 4^x$ is reflected across the x-axis axis and moved 3 units down and 4 units right.

b) $f(x) = \ln x$ is compressed horizontally by a factor of $\frac{1}{2}$ and moved 2 units up.

c) $f(x) = 1.3^x$ is horizontally stretched by a factor of 1.5, reflected across the x-axis, and translated 1 units down.

d) $f(x) = \log x$ is translated 6 units right, vertically compressed by a factor of $\frac{1}{2}$ and translated 8 units up.

Calculator Allowed:

9. Evaluate: (4-4 and 4-6)

a) $\log_{2.5} 30$

b) ln 3.78

c) log 78

10. Solve and check you answer. (4-5 and 4-6)

a) $\log x = -0.2648$

b) $\ln x = 4.61$

c) $3e^{x-1} = 4.8$

11. Solve the following inequalities. Sketch a picture to explain your answer.

a) $\log(x+8) > 2$

b) $\ln(x) < 5 - 3x$

c) $3^{x-1} > 8$

12. The table below shows the profits for several years, in thousands of dollars, of a company that produces computer software. (4-1)

x = years after 1982	0	2	4	6	8	10	12
P = profits (thousand $)	452	761	1218	2067	3582	5205	8349

a) Find an exponential model for the data.

b) Use the model to estimate the profit in the year 1999.

13. If $7400 is deposited in an account at the bank and earns 11% annual interest, compounded continuously, what is the amount in the account, rounded to the nearest dollar, after 5 years? (4-6)

14. A mechanical engineer earned a yearly salary of $50,000 in 1990 and has averaged a 6.2% raise annually for the last 10 years and project that this increase will continue. (4-1)

a) Write an equation for the engineer's yearly salary, S, as a function of n, the number of years since 1990.

b) Estimate the engineer's salary in 1980.

c) How many years will it take for the salary to reach $80,000?

15. A headache medicine is eliminated from the bloodstream at a rate of 12% per hour. Suppose you take a 20 mg tablet at 4:00 pm.

a) Write an equation that models the amount of medicine in the bloodstream.

b) How many mg of medicine are left in the bloodstream at 5:30 pm?

c) How many hours will it take for half the medicine to be eliminated?

16. The radioactive isotope Germanium-71 has a half-life of about 15 days. (4-6)

a) Using $y = ae^{-kt}$, find the decay constant if a scientist has an initial amount of 25 grams.

b) Using your equation, how long until only 1 gram remains? Show/Explain your work!

17. When calibrating a spring scale, you need to know how far the spring stretches for various weights. Hooke's law states that the length a spring stretches is proportional to the weight attached to it. A model for one scale is $l = 0.5w + 3$ where l is the total length (in inches) of the stretched spring and w is the weight (in pounds) of the object. (4-2)

a) Find the inverse of the given model.

b) If you place a weight on the scale and the spring stretches to a total length of 6.5 inches, how heavy is the weight?

18. The table below shows the growth in the number of radio stations after 1955. (4-8)

Find an exponential regression equation using your calculator. Round *a* and *b* to three decimal places. <u>Use your model</u> to predict the number of radio stations in 2001.

Years since 1955	0	5	10	15
Number of Radio Stations	3211	4133	5249	6760