Algebra 2 **Name:** _____
11.1 Homework

Write each expression in either exponential form or logarithm form.

1) $\log_3 81 = 4$ 2) $4^0 = 1$ 3) $\log_5 0.2 = -1$ 4) $\left(\frac{1}{4}\right)^{-2} = 16$

Evaluate the logarithmic functions *without* a calculator.

5) $\log_4 2$ 6) $\log_8 1$ 7) $\log_3 27$

8) $\log_6 36$ 9) $\log_3 243 + \ln(e^{10}) - \log_5 625$

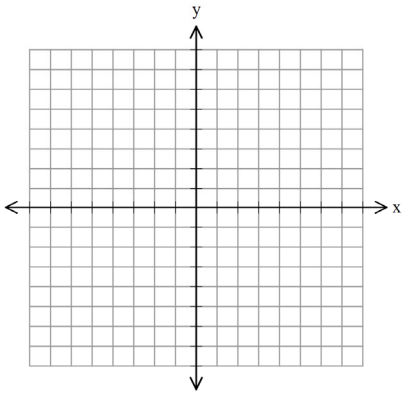
10) $\log_2 32 - \log_{\left(\frac{1}{2}\right)} \left(\frac{1}{8}\right)$ 11) $\ln(e^{5.41}) + \log 10^{6.59}$

Simplify the following expressions.

12) $7^{\log_7 x}$ 13) $\log_{11} 11^x$ 14) $\log_6 36^x$ 15) $e^{\ln 4x}$

Graph the following functions and state their domain and range.

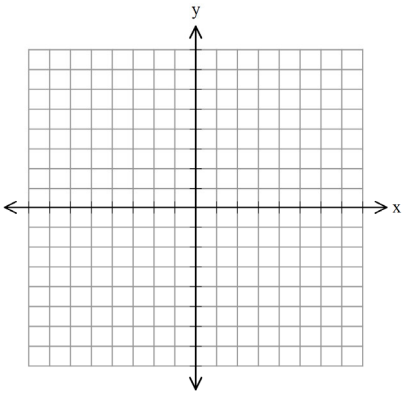
16) $f(x) = e^{x-2} - 3$



Domain:

Range:

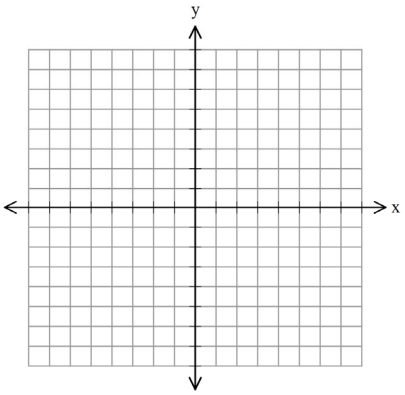
17) $f(x) = \sqrt{x+4} - 5$



Domain:

Range:

18) $g(x) = -\sqrt[3]{x-3} + 2$



Domain:

Range:

19) Simplify the expression: $\sqrt[4]{3e^{5x} \cdot 27e^{7x}}$

A. $\frac{81e^{35x}}{4}$

B. $3e^{8x} \cdot \sqrt[4]{e^{3x}}$

C. $e^{3x} \cdot \sqrt[4]{30}$

D. $3e^{3x}$

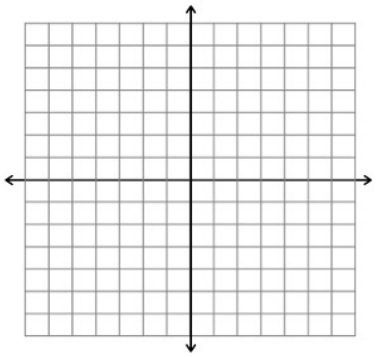
20) Simplify $\sqrt[3]{2x^4 \cdot 16x^8}$

21) Simplify $\sqrt{e^{4x} \cdot e^{9x}}$

Algebra 2 **Name:** _____
11.2 Homework

Graph the following functions. State the transformation from the parent function and the domain and range in set notation.

1. $y = \log_2(x+1)$

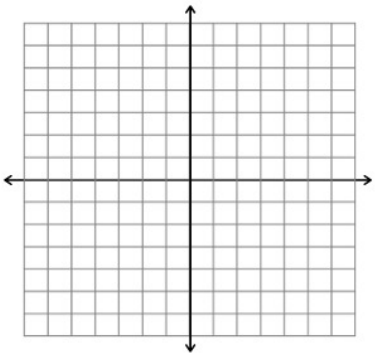


Transformations:

D =

R =

2. $f(x) = \log_2(x-2)+3$

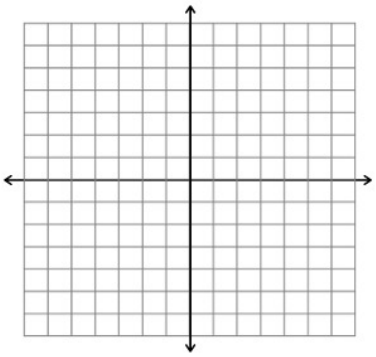


Transformations:

D =

R =

3. $f(x) = \ln(x-2)$

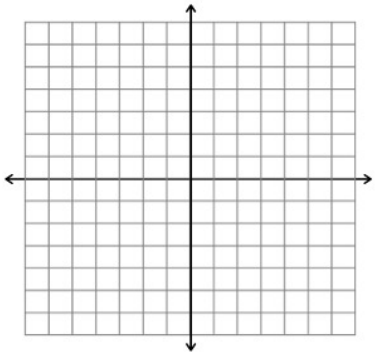


Transformations:

D =

R =

4. $f(x) = -2\ln(x-1)+3$

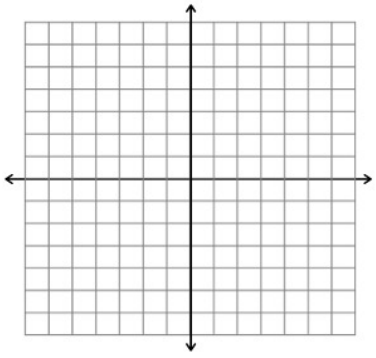


Transformations:

D =

R =

5. $y = -\log_3(x+1)$

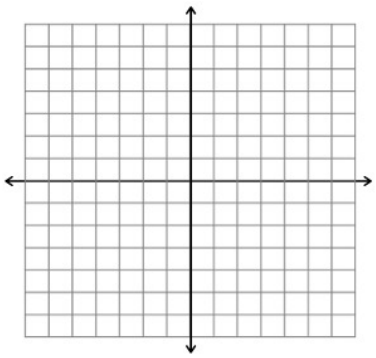


Transformations:

D =

R =

6. $y = \frac{1}{2}\ln x - 3$

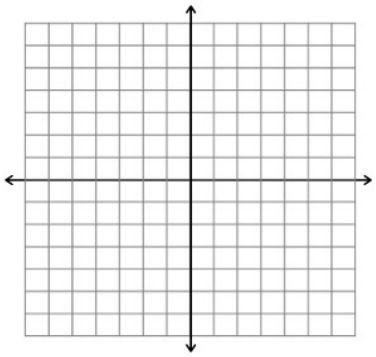


Transformations:

D =

R =

7. $y = \log_2(x-3) - 1$

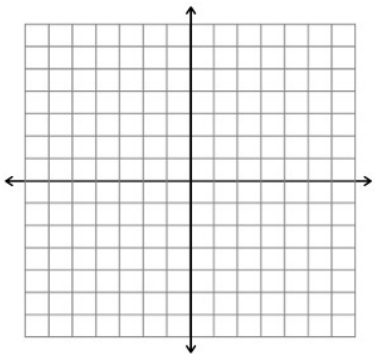


Transformations:

D =

R =

8. $y = 3\log_4(x+3) - 1$



Transformations:

D =

R =

For # 9 - #11, state the domain and range in set notation:

9. $y = \log_4(x+2) + 4$

10. $y = \log_2(x-4)$

11. $y = -\ln x + 2$

Evaluate the logarithms *without* a calculator:

12. $\log_2 16$

13. $\log_{\frac{1}{3}} 27$

14. $\log_3 81 + \log_4 64 - \ln e$

Simplify:

15. $4^{\log_4 64}$

16. $\log_5 25^{4x}$

17. $e^{\ln 14}$

18. Find the inverse function of $g(x) = x^2 + 5$, over the domain $x \geq 0$.

A. $g^{-1}(x) = \sqrt{x-5}$

B. $g^{-1}(x) = \sqrt{x} - 5$

C. $g^{-1}(x) = x^2 - 5$

D. $g^{-1}(x) = \pm\sqrt{y-5}$

Algebra 2 **Name:** _____
11.3 Homework

Evaluate the following logarithmic expressions using log 4 ≈ 0.602 and log 7 ≈ 0.845

1) $\log 28$ 2) $\log\left(\frac{49}{64}\right)$ 3) $\log\frac{1}{7}$ 4) $\log 112$

Expand the following expressions

5) $\log_3(13x)$ 6) $\log_5\left(\frac{6x^4}{2y}\right)$

7) $\ln\left(\frac{z}{xy^2}\right)$ 8) $\log_6\frac{5x^3}{y}$

Condense the following expressions

9) $\log 3 + 3\log x - \log 5$ 10) $2\ln x - \ln 3 + \ln 6 + 12$

11) $3\ln(x+1) - 2\ln y + \ln 2$

12) $\log 4 + 3\log x + \log y$ - 5

Evaluate the following using the change of base formula. Give exact answers and approximate solutions rounded to 3 decimal places.

13) $\log_7 12$

14) $\log_5(1.25)$

15) $\log_{(2.2)} 22$

16) $\log_6 24$

17) Simplify the expression to include only one natural logarithmic term:

$$3\ln a + 2\ln b - 4\ln c + 5$$

A. $\ln\left(\frac{a^3b^2}{c^4}\right) + 5$

C. $\ln(a^3 + b^2 - c^4 + 5)$

B. $\ln\left(\frac{a^3 + b^2 + 5}{c^4}\right)$

D. $\ln\left(\frac{30ab}{4c}\right)$

18) Solve: $4^{5x} = 64^{x+8}$

19) Solve: $\frac{1}{81} = 3^{2x+7}$

Algebra 2 Name: _____
11.4 Homework

Solve each logarithmic equation and check for extraneous solutions. Round to the nearest hundredth when necessary.

1) $\ln(-5x+3) = \ln(2x+2)$

2) $\log_8(4x-7) = \log_8(x+11)$

3) $6 + \log_2 4x = 14$

4) $\log_4(x) + \log_4(x+6) = 2$

5) $\log_2 x + \log_2(x-2) = \log_2 3$

6) $\log_4 x = -1$

7) $7 - \log_3 8x = 2$

8) $\log_2(x-7) + \log_2 x = 3$

Find the mistake. Describe and correct the error in solving the equations.

9) $\log_6(x-1)+\log_6 3x=3$

$\log_6[(x-1)+3x]=3$

$6^{\log_6(4x-1)}=6^3$

$4x-1=216$

$4x=217$

$x=54.25$

10) $\log_3 10x=5$

$e^{\log_3 10x}=e^5$

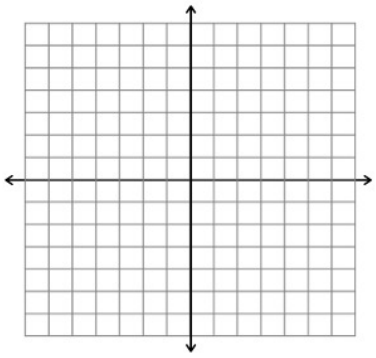
$10x=e^5$

$x=\frac{e^5}{10}$

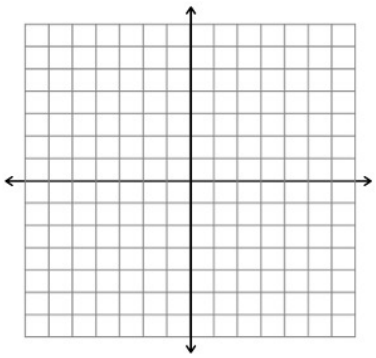
11) The population of deer in a forest preserve can be modeled by the equation $P = 50 + 200 \ln (t + 1)$, where t is the time in years from the present. In how many years will the deer population reach 300?

Graph the functions and state the domain and range in interval notation.

12) $f(x)=-2\cdot 3^{x-1}+5$



13) $y=4^{x+3}-2$



14) Identify the HA and VA: $y=\frac{-2}{x+1}-5$

Algebra 2 Name: _____
11.5 Homework

Solve each exponential equation and check for extraneous solutions. Round to the nearest hundredth when necessary. For #1 and #2 give an exact solution as well.

1) $e^{2x} = 4$

2) $9^x = 35$

3) $10^{x+2} - 12 = 22$

Exact Solution:

Approximate Solution:

Exact Solution:

Approximate Solution:

4) You deposit $3000 in an account that pays 10% annual interest compounded quarterly. How long would it have to remain in the account to have a balance of $3,500? Use the formula $A = P(1 + \frac{r}{n})^{nt}$

5) How much must be deposited into an account that pays 5% interest compounded continuously in order for the balance at the end of 4 years to be $3000? Use the formula $A = Pe^{rt}$

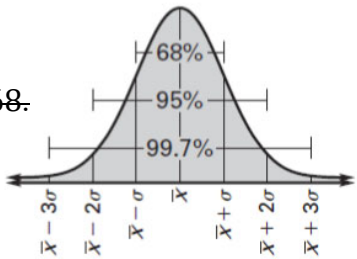
6) If $400 is deposited in an account at a rate of 6.75% compounded continuously, find the amount of time for the balance to double. Use the formula $A = Pe^{rt}$

7) Three people in the business club are competing to see who can double their investment in the shortest amount of time. Each person starts with an initial amount of $3000, but they each choose different investment scenarios. Who will double their investment first based on the following information? Justify your answer with work.

Person A	**Person B**	**Person C**
Interest compounded quarterly $A = P\left(1 + \frac{r}{n}\right)^{nt}$ Rate: 6.2%	Interest compounded daily $A = P\left(1 + \frac{r}{n}\right)^{nt}$ Rate: 5.9%	Interest compounded continuously $A = Pe^{rt}$ Rate: 5.7%

8) A microbiologist is studying a bacteria culture and determines that the population can be modeled by the equation $P = 324 \cdot e^{0.62t}$, where t is the time elapsed in hours. If the microbiologist begins an experiment at 10:00 a.m., what will the bacteria population be at 2:30 p.m.? Round your answers to the nearest whole number.

~~9) A standardized test has a normal distribution with a mean of 68 and a standard deviation of 7. Find the probability that a score is between 54 and 68.~~



~~10) A standardized test has a normal distribution with a mean of 68 and a standard deviation of 7. Find the probability that a score is between 61 and 68 OR above 89.~~

Name_____

Unit 11 Practice Test

For #1 – 3, evaluate the expressions.

1) $\log_3 243$

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

3) $\log_8 \frac{1}{64}$

4) Simplify: $\log_7 49 + \ln(e^{12}) - \log_3 243$

For #5 – 7, rewrite each expression in exponential form or logarithm form.

5) $\log_5 125 = 3$

6) $\log_6 \frac{1}{36} = -2$

7) $64^{5/3} = 1024$

For #8 – 9, <u>expand</u> the expressions.

8) $\log\left(\frac{3x^4}{7y^3}\right)$

9) $\log\left(\frac{x^5y^2}{3z^4}\right)$

For #10 – 12, use the change-of-base formula to evaluate. Give an exact solution and an approximate solution rounded to 3 decimal places.

10) $\log_8 5$

11) $\log_2 6$

12) $\log_5 7$

For #13 – 14, <u>condense</u> the expressions.

13) $4\log_3 2 - 5\log_3 x + \log_3 y + 6$

14) $3\log_5 4 - \log_5 x - 6\log_5 y$

For #15 -16 , solve each equation. Give the exact solution.

15) $e^{0.06t} = 0.4$

16) $3^{0.2x} = 7$

For #17 -21 , solve the equation. Check for extraneous solutions. Round to the nearest hundredth when necessary.

17) $\log_6(x-1) = 2$

18) $4^{-0.03x} + 5 = 8$

19) $\ln(x+9) = \ln(2x-7)$

20) $3\log_8 x - 5 = 4$

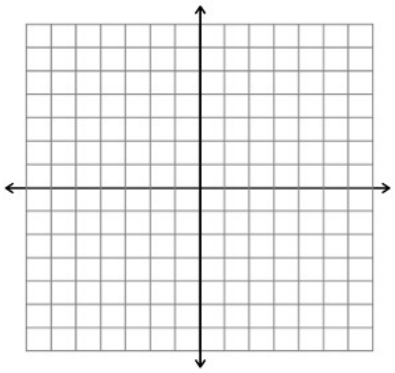
21) $\log_4(3x+16) = \log_4 x + \log_4(x+9)$

22) If $2000 is invested at a rate of 3% compounded continuously, what amount of time would be needed to have a balance of $2500? Use the formula $A = Pe^{rt}$.

23) If you invest $600 earning 6.5% annual interest compounded monthly, how long will it take to double your investment? Use the formula $A = P(1 + \frac{r}{n})^{nt}$

For #24 – 25, graph the function, describe transformations, and state domain and range.

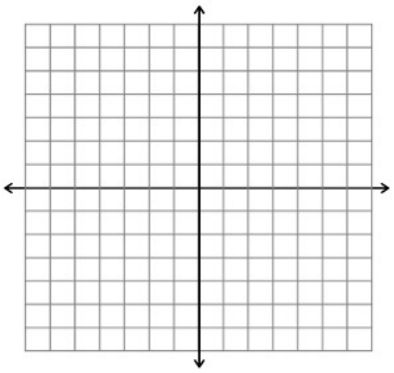
24) $f(x) = -\ln(x - 4)$



Transf:

D: R:

25) $y = \log_3(x + 2) - 3$



Transf:

D: R:

26) **Simplfy:** $7^{\log_7 4}$

-

27) Solve: $\frac{1}{9} = 3^{x-4}$

28) Solve: $36 = 6^{4x-1}$

29) **Simplify:** $\log_4 64 - \log_3 81 + \ln(e^3)$

For #30-31, solve the equation. Check for extraneous solutions. Round to the nearest hundredth when necessary.

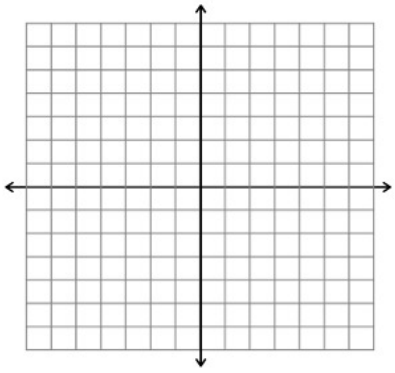
30) $5\log_4(x-3)+7=22$

31) $\log_5(3x+21)=\log_5 x+\log_5(x+7)$

32) State the domain and range (in set notation) of the function $y=\log_4(x+4)-2$

Graph the following function. State the domain and range.

33) $g(x)=-2\log_2(x-3)$



Domain:

Range: