

Student: _____
Date: _____

Instructor: Andreas Lazari
Course: Math1111-Summer2018

Assignment: Section 4.2 Homework

1. Write the equation in its equivalent exponential form.

$$4 = \log_3 81$$

$$3^4 = 81$$

What is the equivalent exponential form of the equation?

$$\underline{3^4 = 81}$$

2. Write the following equation in its equivalent exponential form.

$$6 = \log_b 64$$

The exponential form is $\underline{b^6 = 64}$.
(Type the expression containing b or y on the left side of the equation.)

3. Write the equation in its equivalent logarithmic form.

$$7^4 = 2401$$

What is the equivalent logarithmic form of the equation?

$$\underline{\log_7 2401 = 4}$$

4. Write the equation in its equivalent logarithmic form.

$$c^5 = 961$$

What is the equivalent logarithmic form of the equation?

$$\underline{\log_c 961 = 5}$$

5. Write the equation in its equivalent logarithmic form.

$$7^c = 29$$

What is the equivalent logarithmic form of the equation?

$$\underline{\log_7 29 = c}$$

6. Find the exact value of the logarithm without using a calculator.

$$\log_{11} 121 = x \Rightarrow 11^x = 121 \Rightarrow 11^x = 11^2 \Rightarrow \underline{X=2.}$$

$$\log_{11} 121 = \underline{2}$$

(Type an integer or a simplified fraction.)

7. Evaluate the expression without using a calculator.

$$\log_7 \frac{1}{7} = x \Rightarrow 7^x = \frac{1}{7} \Rightarrow 7^x = 7^{-1} \Rightarrow x = -1$$

$$\log_7 \frac{1}{7} = \underline{-1}$$

8. Evaluate the following expression without using a calculator.

$$\log_3(\sqrt{3}) = x \Rightarrow 3^x = \sqrt{3} \Rightarrow 3^x = 3^{\frac{1}{2}} \Rightarrow x = \frac{1}{2}$$

$$\log_3(\sqrt{3}) = \underline{\frac{1}{2}}$$

9. Evaluate the following expression without using a calculator.

$$\log_{49} 7 = x \Rightarrow 49^x = 7 \Rightarrow (7^2)^x = 7^1 \Rightarrow 7^{2x} = 7^1 \Rightarrow 2x = 1 \Rightarrow x = \frac{1}{2}$$

$$\log_{49} 7 = \underline{\frac{1}{2}} \text{ (Type an integer or a fraction.)}$$

10. Evaluate the following expression without using a calculator.

$$\log_2 2 = x \Rightarrow 2^x = 2^1 \Rightarrow x = 1$$

$$\log_2 2 = \underline{1}$$

11. Evaluate the expression without using a calculator.

$$\log_2 2^3 = x \Rightarrow 2^x = 2^3 \Rightarrow x = 3$$

$$\log_2 2^3 = \underline{3}$$

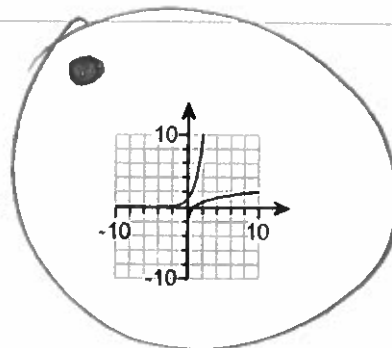
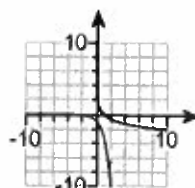
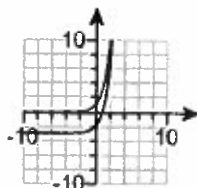
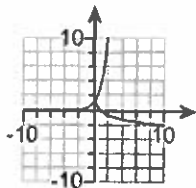
12. Evaluate the following expression without using a calculator.

$$6^{\log_6 7} = 7$$

let $x = \log_6 7 \Rightarrow 6^x = 7$
then $6^x = 7$

$$6^{\log_6 7} = \underline{7}$$

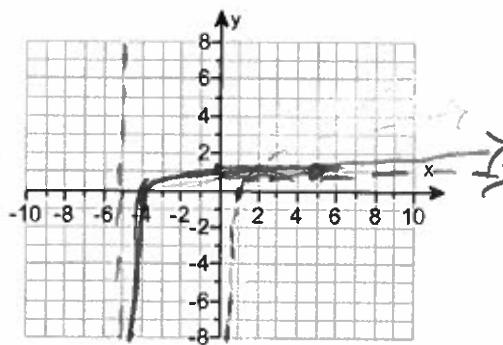
13. Graph $f(x) = 3^x$ and $g(x) = \log_3 x$ in the same rectangular coordinate system.



14. Begin by graphing $f(x) = \log_5 x$. Then use transformations of this graph to graph the given function. What is the vertical asymptote? Use the graphs to determine the given function's domain and range.

$$g(x) = \log_5(x + 5)$$

shift 5 units to the left



Graph the function $g(x) = \log_5(x + 5)$. Graph the asymptote of $g(x)$ as a dashed line. Use the graphing tool to graph the functions.

What is the vertical asymptote of $g(x)$?

$$x = \underline{-5}$$

What is the domain of $g(x) = \log_5(x + 5)$?

$$\underline{(-5, \infty)}$$

(Simplify your answer. Type your answer in interval notation.)

What is the range of $g(x) = \log_5(x + 5)$?

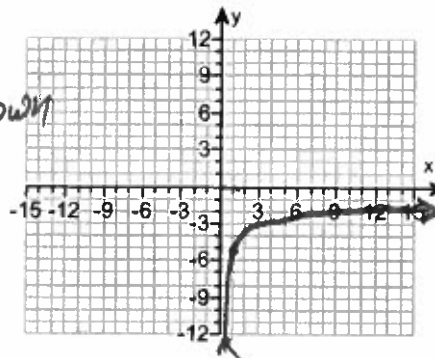
$$\underline{(-\infty, \infty)}$$

(Simplify your answer. Type your answer in interval notation.)

15. Begin by graphing $f(x) = \log x$. Use transformations of this graph to graph the given function. Graph and give the equation of the asymptote. Use the graphs to determine the function's domain and range.

$$h(x) = \log x - 5$$

shift 5 units down



Graph $h(x) = \log x - 5$. Graph the asymptote of $h(x)$ as a dashed line. Use the graphing tool to graph the function.

What is the vertical asymptote of $h(x)$?

$$x = \underline{0}$$

What is the domain of $h(x) = \log x - 5$?

$$\underline{(0, \infty)}$$

(Simplify your answer. Type your answer in interval notation.)

What is the range of $h(x) = \log x - 5$?

$$\underline{(-\infty, \infty)}$$

(Simplify your answer. Type your answer in interval notation.)

16. Find the domain of the function.

$$g(x) = \log_3(x + 8)$$

The domain of g is $(-8, \infty)$
(Type your answer in interval notation.)

17. Evaluate the expression without using a calculator.

$$\log 100 = \log_{10} 100 = x \Rightarrow 10^x = 100 \Rightarrow 10^x = 10^2 \Rightarrow x = 2.$$

$$\log 100 = \underline{2}$$

18. Evaluate the expression without using a calculator.

$$10^{\log 6} = 10^x = 6 \quad \text{let } x = \log_{10} 6 \Rightarrow 10^x = 6$$

$$10^{\log 6} = \underline{6}$$

19. Evaluate the expression without using a calculator.

$$\ln e^8 = \log_e e^8 \Rightarrow e^x = e^8 \Rightarrow x = 8$$

$$\ln e^8 = \underline{8}$$

20. Evaluate or simplify the expression without using a calculator.

$$e^{\ln 129} = e^x = 129 \quad \text{let } x = \ln 129 \Rightarrow x = \log_e 129 \Rightarrow e^x = 129.$$

$$e^{\ln 129} = \underline{129}$$

21. The loudness level of a sound, D , in decibels, is given by the formula $D = 10 \log (10^{12} I)$, where I is the intensity of the sound, in watts per meter². Decibel levels range from 0, a barely audible sound, to 160, a sound resulting in a ruptured eardrum. The sound of a certain animal can be heard 500 miles away, reaching an intensity of 6.1×10^5 watts per meter². Determine the decibel level of this sound. At close range, can the sound of this animal rupture the human eardrum?

The decibel level of this animal's sound is approximately 178 decibels.
(Round to the nearest whole number as needed.)

$$D = 10 \log_{10} (10^{12} \cdot (6.1 \times 10^5))$$

$$= 177.85329$$

$$\approx 178$$

At close range, can the sound of this animal rupture the human eardrum?

- Yes, the sound can rupture the human eardrum.
 No, the sound cannot rupture the human eardrum.

1. $3^4 = 81$

2. b^6

64

3. $4 = \log_7 2401$

4. $5 = \log_c 961$

5. $\log_7 29 = c$

6. 2

7. -1

8. $\frac{1}{2}$

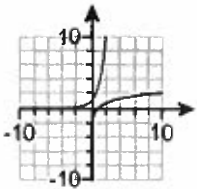
9. $\frac{1}{2}$

10. 1

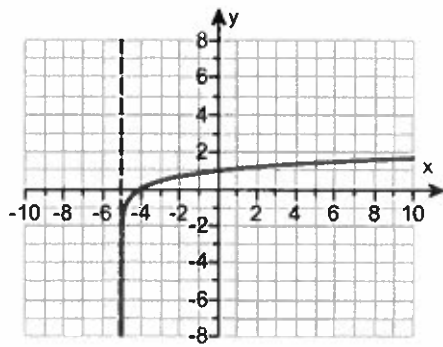
11. 3

12. 7

13.



14.

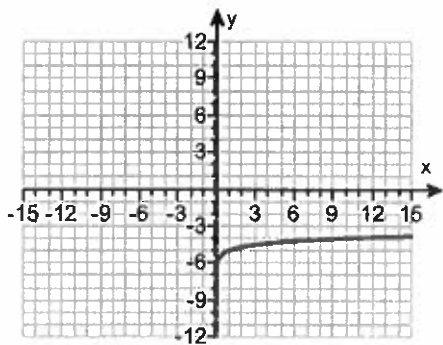


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(- 5, ∞)

(- ∞, ∞)

15.



0

(0, ∞)

(- ∞, ∞)

16. (- 8, ∞)

17. 2

18. 6

19. 8

20. 129

21. 178

Yes, the sound can rupture the human eardrum.
