

SM3 11.3-11.5 Review

Name _____ Date _____ Period Key

Rewrite the equation in exponential form.

1. $\log_2 32 = 5$ $2^5 = 32$ 2. $\log_3 \frac{1}{9} = -2$ $3^{-2} = \frac{1}{9}$ 3. $\log_e 3 = x$ $e^x = 3$

Solve. Show all work.

4. $\log_2 64 = x$ $2^x = 64$ $2^x = 2^6$ $x = 6$
 5. $\log_5 x = -3$ $5^{-3} = x$ $\frac{1}{5^3} = x$ $x = \frac{1}{125}$
 6. $\log_{32} x = \frac{1}{5}$ $32^{1/5} = x$ $\sqrt[5]{32} = x$ $x = 2$

Rewrite the equation in logarithmic form.

7. $8^{-3} = \frac{1}{512}$ $\log_8 \frac{1}{512} = -3$
 8. $x^3 = 216$ $\log_x 216 = 3$
 9. $10^x = \frac{1}{1000}$ $\log \frac{1}{1000} = x$

Evaluate without a calculator. Show work.

10. $\log_4 64$ $\log_4 4^3 = 3$
 11. $\ln e^{-7} = \ln e e^{-7} = -7$

Evaluate to the nearest ten thousandths. (Use a calculator.)

12. $\log 27$ 1.4314 13. $\ln 19.05$ 2.9471 14. $\log(-34)$ no solution

Solve. Show all work.

15. $\log_4(x-1) = 2$ $4^2 = x-1$ $16 = x-1$ $x = 17$
 16. $\log_3(x^2+6x) = 2$ $3^2 = x^2+6x$ $9 = x^2+6x$ $0 = x^2+6x-9$ $0 = (x+3)(x-3)$ $x = -3$
 17. $\ln e^x = 10$ $e^{10} = e^x$ $x = 10$

18. Use transformations and 3 key points to graph each function without a graphing calculator.

$f(x) = -1 - \log(x-4) \Rightarrow f(x) = -\log(x-4) - 1$

Transformations: Reflect over x-axis
 Right 4
 Down 1

Domain: $(4, \infty)$ Range: $(-\infty, \infty)$

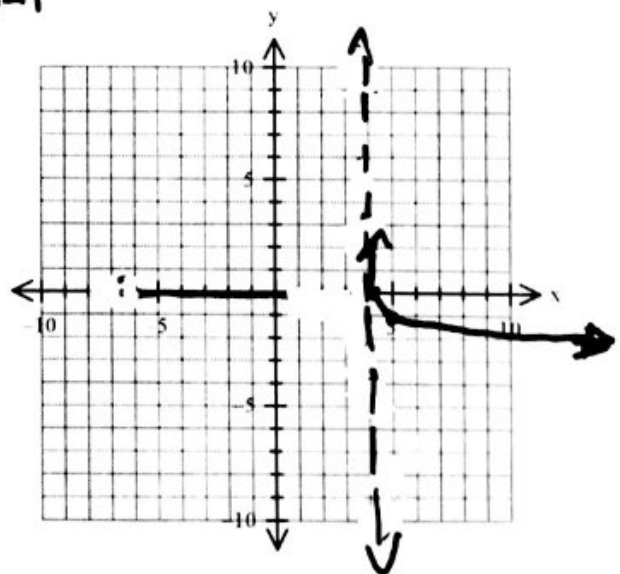
Vertical asymptote: $x = 4$

Key points:

x	f(x)
4+	10
4+	1
4+	10

-1
-1
-1

x	f(x)
9/10	0
5	-1
14	-2



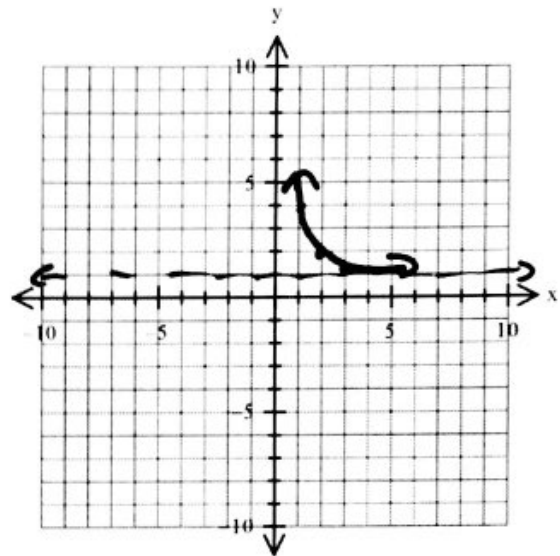
19. Use transformations and 3 key points to graph each function without a graphing calculator.

$$f(x) = 3^{-x^2+1}$$

Transformations: Reflect over y axis
Right 2
up 1

Domain: $(-\infty, \infty)$ Range: $(1, \infty)$

Horizontal asymptote: $y = 1$



Key points:

x	f(x)
3	1
2	2
1	4

x	f(x)
3	1
2	2
1	4

Assuming x and y are positive, use properties of logarithms to write the expression as a sum or difference of logarithms with the exponent as a factor.

20. $\log x^4 y$

$$\log x^4 + \log y$$

$$\boxed{4 \log x + \log y}$$

21. $\log \frac{x^2}{y}$

$$\log x^2 - \log y$$

$$\boxed{2 \log x - \log y}$$

22. $\ln 2\sqrt{x}$

$$\ln 2 + \ln \sqrt{x}$$

$$\ln 2 + \ln x^{1/2}$$

$$\boxed{\ln 2 + \frac{1}{2} \ln x}$$

Assuming x and y are positive, use properties of logarithms to write the expression as single logarithm.

23. $\log y - 3 \log x$

$$\log y - \log x^3$$

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

24. $9 \log_7 x + 8 \log_7 y$

$$\log_7 x^9 + \log_7 y^8$$

$$\log_7 (x^9 y^8)$$

25. $\ln(x+6) + \ln(3x-4)$

$$\ln(x+6)(3x-4)$$

$$\ln(3x^2 + 14x - 24)$$

Rewrite using change of base formula. Then use your calculator to evaluate the logarithm to the nearest ten thousandths.

26. $\log_5 13$

$$\frac{\log 13}{\log 5}$$

$$\boxed{2.3347}$$

27. $\log_{\sqrt{5}} 3$

$$\frac{\log 3}{\log \sqrt{5}}$$

$$\boxed{1.3652}$$

28. $\log_{\pi} 9$

$$\frac{\log 9}{\log \pi}$$

$$\boxed{1.9194}$$

Use properties of logarithms to find the exact value of each expression. (Do not use a calculator).

29. $\log_{11} 22 - \log_{11} 2$

$$\log_{11} \left(\frac{22}{2} \right)$$

$$\log_{11} 11$$

$$\boxed{1}$$

30. $2^{\log_2 5 + \log_2 3}$

$$2^{\log_2 5 \cdot 3}$$

$$2^{\log_2 15}$$

$$\boxed{15}$$

31. $\log_6 2 + \log_6 18$

$$\log_6 2 \cdot 18$$

$$\log_6 36$$

$$\log_6 6^2 = \boxed{2}$$