

7.2 Corrective Assignment – LOGARITHMIC FUNCTIONS Name: _____

Pre-Calculus

For 1-2, Expand the logarithm. (NOT LIKE T H I S ! ! !)

1. $3 \ln ab^{\frac{1}{2}}c = 3(\ln a + \ln b^{\frac{1}{2}} + \ln c)$
 $= 3 \ln a + 3 \ln b^{\frac{1}{2}} + 3 \ln c$
 $= 3 \ln a + \frac{3}{2} \ln b + 3 \ln c$

2. $\ln \frac{\sqrt{x^2}}{yz} = \ln \frac{x}{yz}$
 $= \ln x - \ln y - \ln z$

For 4-6, Rewrite the expression as a single log. (C o n d e n s e!)

3. $5 \log a + 2 \log b - 3 \log c$
 $= \log a^5 + \log b^2 - \log c^3$
 $= \log \frac{a^5 b^2}{c^3}$

4. $\frac{\ln x}{4} + \ln y - 5 \ln z$
 $= \frac{1}{4} \ln x + \ln y - \ln z^5$
 $= \ln x^{\frac{1}{4}} + \ln y - \ln z^5$
 $= \ln \frac{x^{\frac{1}{4}} y}{z^5}$

Solve for x using the "Bean method" (change of base formula). Show your work! Go out four places!

5. $2^x = 14$
 $\log 2^x = \log 14$
 $x \log 2 = \log 14$
 $x = \frac{\log 14}{\log 2}$
 $x \approx 3.8074$

6. $8^x = 120$
 $\log 8^x = \log 120$
 $x \log 8 = \log 120$
 $x = \frac{\log 120}{\log 8}$
 $x \approx 2.3023$

7. $16^x = 64$
 $\log 16^x = \log 64$
 $x \log 16 = \log 64$
 $x = \frac{\log 64}{\log 16}$
 $x = 1.5$

Solve for x by using the "Brust method" (canceling the base with logs). Show your work! Go out four places!

8. $10^x = 15$
 $\log 10^x = \log 15$
 $x = \log 15$
 $x \approx 1.17610$

9. $64^x = 1024$
 $\log_{64} 64^x = \log_{64} 1024$
 $x = \log_{64} 1024$
 $x = \frac{\log 1024}{\log 64}$
 $x \approx 1.6667$

10. $500^x = 50$
 $\log_{500} 500^x = \log_{500} 50$
 $x = \log_{500} 50$
 $x = \frac{\log 50}{\log 500}$
 $x \approx 0.6295$

Solve for x by using the Sully method (by graphing). Tell the point of intersection used to solve the equation.

11. $7^x = 17$
 $x = \underline{1.456}$ Point (1.456, 17)

12. $14^x = 22$
 $x = \underline{1.171}$ Point (1.171, 22)

13. $20^x = 20$
 $x = \underline{1}$ Point (1, 20)

Find x , y , or b as indicated in the following problems.

14. $\log_4 x = 16$ $4^{16} = x$	15. $\log_{32} 8 = y$ $32^y = 8$ $(2^5)^y = 2^3$ $2^{5y} = 2^3$ $5y = 3$ $y = \frac{3}{5}$	16. $\log_b 16 = \frac{1}{2}$ $(b^{\frac{1}{2}})^2 = (16)^2$ $b = 256$	17. $\log_b 10 = 0$ $b^0 = 10$ $1 \neq 10$ No Solution
18. $\log_{81} x = \frac{1}{2}$ $81^{\frac{1}{2}} = x$ $9 = x$	19. $\log_{\frac{1}{3}} 27 = y$ $\log_{\frac{1}{3}} (\frac{1}{3})^{-3} = y$ $-3 = y$	20. $\log_b 1000 = \frac{3}{2}$ $(b^{\frac{3}{2}})^{\frac{2}{3}} = (1000)^{\frac{2}{3}}$ $b = (10)^2$ $b = 100$	

Use logarithms to find the inverse of the given function.

21. $f(x) = 2^x + 3$ $x = 2^y + 3$ $x - 3 = 2^y$ Exponential Form $\log_2(x-3) = y$ Log Form	22. $f(x) = 12^x$ $x = 12^y$ Exponential Form $\log_{12} x = y$ Log Form	23. $f(x) = 5^{x-5}$ $x = 5^{y-5}$ $\log_5 x = y - 5$ Exponential Form $5 + \log_5 x = y$ Log Form
24. $f(x) = \ln(12x)$ $x = \ln(12y)$ Log Form $e^x = 12y$ Exponential Form $\frac{e^x}{12} = y$	25. $\log y = 2 \log x - 1$ $\log x = \frac{2 \log y + 1}{2}$ $\log x + 1 = 2 \log y$ $\frac{\log x + 1}{2} = \log_{10} y$ Log Form $10^{\frac{\log x + 1}{2}} = y$ Exponential Form	26. $\log y = \frac{\log x + 6}{6}$ $\log x = \frac{6 \log y - 6}{1} = 6 \log y - 6$ $\log x - 6 = 6 \log y - 6$ $6 \log x - 6 = \log_{10} y$ Log Form $10^{\frac{6 \log x - 6}{1}} = y$ Exponential Form

Answers:

- $\ln a^3 + \ln c^3 + \ln \sqrt{b^3}$
- $\ln x - \ln y - \ln z$
- $\log \frac{a^5 b^2}{c^3}$
- $\ln \frac{y^4 x}{z^5}$
- $x = 3.8074$
- $x = 2.3023$
- $x = 1.5$
- $x = 1.1761$
- $x = 1.6667 \approx \frac{5}{3}$
- $x = 0.6295$
- $x = 1.4560$ (1.4560, 17)
- $x = 1.1713$ (1.1713, 22)
- $x = 1$ (1, 20)
- $x = 4^{16} = 4294967296$
- $y = \frac{3}{5}$
- $b = 256$
- No Solution
- $x = 9$
- $y = -3$
- $b = 100$
- $f^{-1}(x) = \frac{\log(x-3)}{\log 2}$
- $f^{-1}(x) = \frac{\log(x)}{\log 12}$
- $f^{-1}(x) = \frac{\log(x)}{\log 5} + 5$
- $f^{-1}(x) = \frac{e^x}{12}$
- $f^{-1}(x) = 10^{\frac{1}{2} \log x + \frac{1}{2}}$
- $f^{-1}(x) = 10^{6 \log x - 6}$