

Log Worksheet #2 (Pre-Calc)

Name Key

Complete this worksheet without the use of a calculator.

Write as a single logarithm:

1. $\ln 9 + \ln 5$

$\ln(9 \cdot 5)$
 $\ln 45$

2. $\ln 7 - \ln 20$

$\ln \frac{7}{20}$

3. $\frac{1}{2} \ln 7 + 3 \ln 5$

$\ln 7^{1/2} + \ln 5^3$
 $\ln 7^{1/2} \cdot 5^3 = \ln 125\sqrt{7}$

4. $\frac{1}{2} \ln 25 + \ln 2$

$\ln 25^{1/2} + \ln 2$
 $\ln 5 + \ln 2 = \ln(5 \cdot 2) = \ln 10$

5. $\ln(x+5) - \ln x$

$\ln \frac{x+5}{x}$

6. $\frac{1}{2} \ln 4 - \ln 2$

$\ln 4^{1/2} - \ln 2$
 $\ln 2 - \ln 2 = 0$

7. $\ln 7 + 5$

$\ln 7 + \ln e^5$
 $\ln 7e^5$

8. $8 - \ln 5$

$\ln e^8 - \ln 5$
 $\ln \frac{e^8}{5}$

9. $\ln 2 + \ln 5 - 3$

$\ln 2 + \ln 5 - \ln e^3$
 $\ln \frac{2 \cdot 5}{e^3} = \ln \frac{10}{e^3}$

Solve for x.

10. $\log_2(3x-2) = \log_2(2x+6)$

$3x-2 = 2x+6$
 $x = 8$

11. $\log(x+3) + \log 2 = \log 20$

$\log(2x+6) = \log 20$
 $2x+6 = 20$
 $2x = 14$
 $x = 7$

12. $\log_3 x - \log_3 4 = \log_3 12$

$\log_3 \frac{x}{4} = \log_3 12$
 $\frac{x}{4} = 12$
 $x = 48$

13. $\ln x + \ln(x+2) = \ln 8$

$\ln(x^2+2x) = \ln 8$
 $x^2+2x = 8$
 $x^2+2x-8 = 0$
 $(x+4)(x-2) = 0$
 $x+4 = 0 \rightarrow x = -4$
 $x-2 = 0 \rightarrow x = 2$

14. $2 \log_3 x + \log_3 4 = 4$

$\log_3 x^2 + \log_3 4 = 4$
 $\log_3 4x^2 = 4$
 $3^4 = 4x^2$
 $\frac{81}{4} = x^2$
 $\frac{9}{2} = x$

15. $\ln x + \ln(x-3) = \ln 10$

$\ln(x^2-3x) = \ln 10$
 $x^2-3x = 10$
 $x^2-3x-10 = 0$
 $(x-5)(x+2) = 0$
 $x-5 = 0 \rightarrow x = 5$
 $x+2 = 0 \rightarrow x = -2$

16. $\ln x^2 = 10$

$e^{10} = x^2$
 $x = \pm e^5 \approx \pm 148.413$

17. $\ln(2x+1) = 5$

$e^5 = 2x+1$
 $e^5 - 1 = 2x$
 $x = \frac{e^5 - 1}{2} \approx 73.707$

18. $\ln \sqrt{x} = 3$

$(e^3)^2 = \sqrt{x}^2$
 $e^6 = x$
 $403.429 \approx x$

19. $\ln x + \ln 3 = 5$

$\ln 3x = 5$
 $e^5 = 3x$
 $\frac{e^5}{3} = x$
 $x \approx 49.471$

20. $e^{-x} = 2$

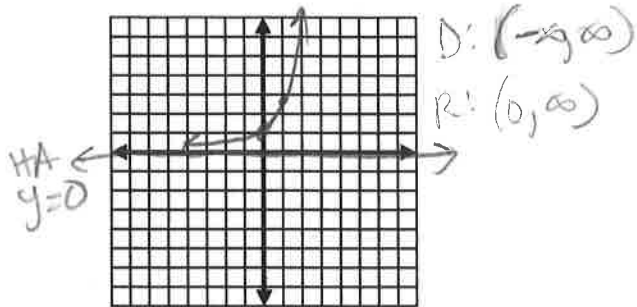
$-x = \ln 2$
 $x = -\ln 2$
 $x \approx -0.693$

21. $e^{x+4} = 1$

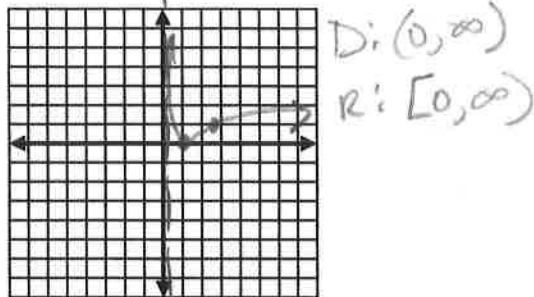
$\ln 1 = x+4$
 $x = \ln 1 - 4 = 0 - 4$
 $x = -4$

Give the domain and range of each function and sketch the graph.

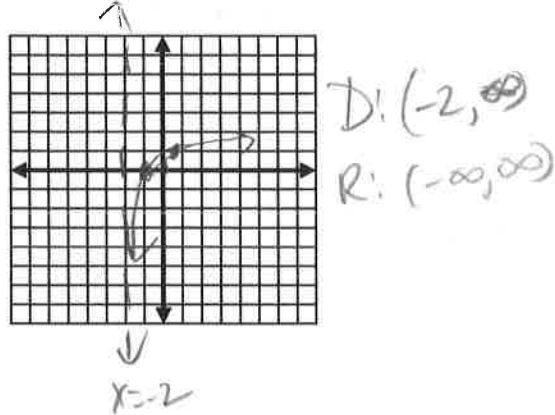
22. $f(x) = e^x$



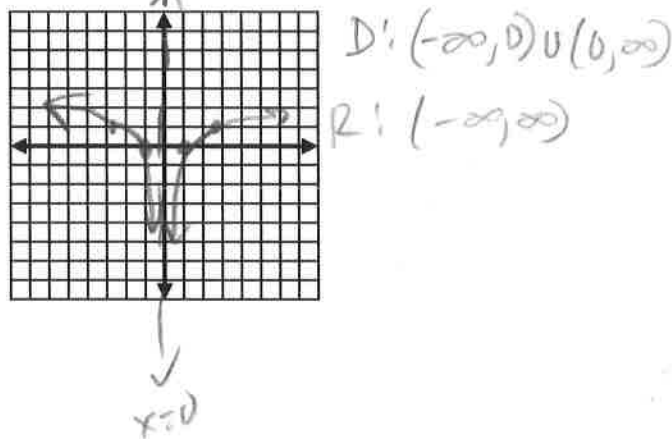
23. $f(x) = |\ln x|$



24. $f(x) = \ln(x+2)$



25. $f(x) = \ln|x|$



Given $\log 2 = x$, $\log 3 = t$, $\log 10 = 1$, $\log 100 = 2$ find:

26. $\log 12$
 $\log(2^2 \cdot 3)$
 $2\log 2 + \log 3$
 $2x + t$

27. $\log 216$
 $\log 6^3 = \log(2 \cdot 3)^3$
 $3\log 2 + 3\log 3$
 $3x + 3t$

28. $\log \sqrt{50} - \log 50$
 $\log \left(\frac{100}{2}\right)^{1/2}$
 $\frac{1}{2} \log 100 - \frac{1}{2} \log 2$
 $\frac{1}{2} \cdot 2 - \frac{1}{2}x = 1 - \frac{1}{2}x$

29. $\log 150$
 $\log \left(\frac{3 \cdot 100}{2}\right)$
 $\log 3 + \log 100 - \log 2$
 $t + 2 - x$

30. $\log \sqrt[3]{3}$
 $\log 3^{1/3} = \frac{1}{3} \log 3$
 $= \frac{1}{3}t$

31. $\log 45^2$
 $2 \log 45 = 2 \log(3^2 \cdot \frac{10}{2})$
 $2[2\log 3 + \log 10 - \log 2]$
 $4\log 3 + 2\log 10 - 2\log 2$
 $4t + 2 - 2x$

32. $\log \frac{18}{5}$
 $\log \frac{3^2 \cdot 2}{10}$

33
38. $\log 300$
 $\log(3 \cdot 100)$
 $\log 3 + \log 100$
 $t + 2$

34. $\log .002$
 $\log \frac{2}{1000}$

$2\log 3 + \log 2 - (\log 10 - \log 2)$
 $2t + x - (1 - x)$
 $2t + x - 1 + x$
 $2t + 2x - 1$

$\log 2 - \log 1000$
 $x - 3$