

MATH ANALYSIS I HONORS

Review for quiz

2016

Logarithms ch. 5

NAME

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DATE

PERIOD

Without a calculator - write in exponential form and solve.

1. $\log 100$

$= 2$

2. $\ln e$

$= 1$

3. $\log_4 1$

$= 0$

4. $\log_3 \sqrt{27} = \frac{3}{2}$

5. $\log_9 \frac{1}{81} = -2$

6. $\log_3 \sqrt[3]{3}$

$= \frac{1}{3}$

7. $\log_{25} 5 = \frac{1}{2}$

8. $\log 0.1 = -1$

9. $\ln e^2 = 2$

Without a calculator - Estimate what two integers x lies between.

10. $6^x = 100$

$6^2 = 36$ $6^3 = 216$
So x between 2 and 3

11. $10^x = 7,500,000$

x between 6 and 7

Solve for x- You may use a calculator- Round to three decimal places.

12. $4(3^x) = 33$

$3^x = \frac{33}{4}$

$x \log 3 = \log \frac{33}{4}$ $x = 1.921$

13. $(2x)^3 = 89$

$2x = \sqrt[3]{89}$

$x = 2.232$

14. $3 \ln(5x) = 10$

$\ln 5x = \frac{10}{3}$

$5x = e^{\frac{10}{3}}$

$x = 5.606$

15. $2 \ln x + 10 = 7$

$2 \ln x = -3$

$\ln x = -\frac{3}{2}$

$x = e^{-\frac{3}{2}} = 0.223$

16. $(3x)^2 = \sqrt{10}$

$3x = \pm 10^{\frac{1}{4}}$

$x = \pm 0.593$

17. $3^{2x-7} - 4 = 13$

$3^{2x-7} = 17$

$(2x-7) \log 3 = \log 17$

$2x-7 = \frac{\log 17}{\log 3}$

$x = 4.789$

18. $\log_3(x+3) + \log_3 x = 2$

$\log_3 x(x+3) = 2$

$x(x+3) = 3^2 = 9$

$x^2 + 3x - 9 = 0$

$x = \frac{-3 \pm \sqrt{9+36}}{2} \Rightarrow x = 1.854$

19. $\log_4 12 = x$

$x = \frac{\log 12}{\log 4} = 1.792$

Solve for x - No calculator

20. $2^{2-x} = 8^{4-x}$
 $2^{2-x} = 2^{3(4-x)}$
 $2-x = 3(4-x) = 12-3x$
 $2x = 10$ $x = 5$

22. $\log_6(x+1) + \log_6 x = 1$
 $\log_6(x+1)x = 1$
 $x(x+1) = 6$
 $x^2 + x - 6 = 0$ $x = 2$

24. $\log_9 x = -3/2$
 $x = 9^{-3/2} = (3^2)^{-3/2}$
 $= 3^{-3} = \frac{1}{27}$

26. $\log_5(25\sqrt{5}) = x$
 $5^x = 25\sqrt{5} = 5^2 \cdot 5^{1/2} = 5^{5/2}$
 $x = \frac{5}{2}$

21. $\log(x-2) + \log x = \log 3$
 $\log x(x-2) = \log 3$
 $x(x-2) = 3$
 $x^2 - 2x - 3 = 0$
 $(x+1)(x-3) = 0$
 $x = 3$

23. $2\log x - \log(2x-3) = \log x$
 $\log x^2 = \log(2x-3) + \log x$
 $\log x^2 = \log(2x-3)x$
 $x^2 = x(2x-3)$
 $x^2 - 3x = 0$ $x = 3$

25. $\log_x 625 = 4$
 $x^4 = 625$
 $x = 5$

27. $3\log_3 5 + \log_3 10 = x$
 $3\log_3 5 \cdot 3\log_3 10 = x$
 $5 \cdot 10 = x$
 $x = 50$

Use the law of logs to write each expression in terms of log M and log N

28. $\log M\sqrt{N}$
 $\log M + \frac{1}{2}\log N$

29. $\log \frac{M^2}{N}$
 $2\log M - \log N$

30. Combine into one log
 $\frac{1}{2}\ln M - \frac{1}{2}\ln N$
 $\ln \sqrt{\frac{M}{N}}$ or $\frac{1}{2}\ln \frac{M}{N}$

Combine into a single log and solve - No calculator

31. $\log_2 20 - \log_2 5 + \log_2 8$
 $= \log_2 \frac{20}{5} \cdot 8 = \log_2 32 = \log_2 2^5 = 5 \log_2 2 = 5$

32. $\frac{1}{2}\log_8 49 + \log_8 4 - \log_8 14$
 $= \log_8 49^{1/2} + \log_8 4 - \log_8 14 = \log_8 7 + \log_8 4 - \log_8 14$
 $= \log_8 \frac{4 \cdot 7}{14} = \log_8 2 = \frac{1}{3}$
 $\swarrow 8^{1/3} = 2$