Alg II CW/HW 03/26/2019

Kuta - Inf Alg 2

Solving Exponential Equations w/ Logarithms

2 - 26 E

2) $12^r = 13$

$\log_{12} 12^r = \log_{12} 13$

$r = \log_{12} 13$

$r = \frac{\ln 13}{\ln 12} \approx 1.0322$

L.H.S.	R.H.S.
$= 12^{1.0322}$	$= 13$
≈ 12.9997 ✓	

4) $16^v = 67$

$\log_{16} 16^v = \log_{16} 67$

$v = \log_{16} 67$

$v = \frac{\ln 67}{\ln 16}$

$v = 1.5165$

L.H.S.	R.H.S.
$= 16^{1.5165}$	$= 67$
≈ 66.9959 ✓	

6) $6^r = 51$

$\log_6 6^r = \log_6 51$

$r = \log_6 51$

$r = \frac{\ln 51}{\ln 6}$

$r \approx 2.1944$

L.H.S.	R.H.S
$= 6^{2.1944}$	$= 51$
≈ 51 ✓	

8) $20^r = 56$

$\log_{20} 20^r = \log_{20} 56$

$r = \log_{20} 56$

$r = \frac{\ln 56}{\ln 20}$

$r \approx 1.3437$

L.H.S.	R.H.S
$= 20^{1.3437}$	$= 56$
≈ 56 ✓	

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10) $e^{x-1} - 5 = 5$

$e^{x-1} = 10$

$\ln e^{x-1} = \ln 10$

$x - 1 = \ln 10$

$x = 1 + \ln 10$

$x \approx 3.3026$

L.H.S.	R.H.S.
$= e^{3.3026-1} - 5$	$= 5$
$= e^{2.3026} - 5$	
≈ 5 ✓	

12) $11^{n-8} - 5 = 54$

$11^{n-8} = 59$

$\log_{11} 11^{n-8} = \log_{11} 59$

$n - 8 = \log_{11} 59$

$n = 8 + \frac{\ln 59}{\ln 11}$

$n = 9.7005$

L.H.S.	R.H.S.
$11^{9.7005-8} - 5$	$= 54$
$11^{1.7005} - 5$	
$= 54.005$ ✓	

14) $20^{-6n} + 6 = 55$

$20^{-6n} = 49$

$\log_{20} 20^{-6n} = \log_{20} 49$

$-6n = \log_{20} 49$

$n = -\frac{1}{6} \cdot \frac{\ln 49}{\ln 20}$

$n \approx -0.2165$

L.H.S.	R.H.S.
$20^{-6(-0.2165)} + 6$	$= 55$
≈ 54.98 ✓	

16) $8^{-5a} - 5 = 53$

$8^{-5a} = 58$

$\log_8 8^{-5a} = \log_8 58$

$-5a = \log_8 58$

$a = -\frac{1}{5} \frac{\ln 58}{\ln 8}$

$a \approx -0.3905$

L.H.S	R.H.S.
$= 8^{-5(-0.3905)} - 5$	$= 53$
$\approx 57.98 - 5$	
≈ 52.98 ✓	

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18) $-6e^{8n+8} - 3 = -23$

$-6e^{8n+8} = -20$

$e^{8n+8} = \frac{10}{3}$

$\ln e^{8n+8} = \ln \frac{10}{3}$

$8n+8 = \ln \frac{10}{3}$

$8n = -8 + \ln \frac{10}{3}$

$n = -1 + \frac{1}{8}\ln \frac{10}{3}$

$n \approx -0.8495$

L.H.S.	R.H.S
$= -6e^{8(-0.8495)+8} - 3$	$= -23$
≈ -23.0005 ✓	

20) $-2e^{7v+5} - 10 = -17$

$-2e^{7v+5} = -7$

$e^{7v+5} = \frac{7}{2}$

$\ln e^{7v+5} = \ln \frac{7}{2}$

$7v+5 = \ln \frac{7}{2}$

$7v = -5 + \ln \frac{7}{2}$

$v = -\frac{5}{7} + \frac{1}{7}\ln \frac{7}{2}$

$v \approx -0.5353$

L.H.S.	R.H.S
$-2e^{7(-0.5353)+5} - 10$	$= -17$
≈ -17.001 ✓	

22) $-3e^{9x-1} + 6 = -58$

$-3e^{9x-1} = -64$

$e^{9x-1} = \frac{64}{3}$

$\ln e^{9x-1} = \ln \frac{64}{3}$

$9x-1 = \ln \frac{64}{3}$

$9x = 1 + \ln \frac{64}{3}$

$x = \frac{1}{9}(1 + \ln \frac{64}{3})$

$x \approx 0.4511$

L.H.S.	R.H.S
$= -3e^{9(0.4511)-1} + 6$	$= -58$
≈ -57.976 ✓	

 Name_____

Solving Exponential Equations with Logarithms

Date_____ Period____

Solve each equation. Round your answers to the nearest ten-thousandth.

1) $3^b = 17$

2) $12^r = 13$

3) $9^n = 49$

4) $16^v = 67$

5) $3^a = 69$

6) $6^r = 51$

7) $6^n = 99$

8) $20^r = 56$

9) $5 \cdot 18^{6x} = 26$

10) $e^{x-1} - 5 = 5$

11) $9^{n+10} + 3 = 81$

12) $11^{n-8} - 5 = 54$

13) $16^{n-7} + 5 = 24$

14) $20^{-6n} + 6 = 55$

15) $5 \cdot 6^{3m} = 20$

16) $8^{-5a} - 5 = 53$

17) $3.4e^{2-2n} - 9 = -4$

18) $-6e^{8n+8} - 3 = -23$

19) $-e^{-3.9n-1} - 1 = -3$

20) $-2e^{7v+5} - 10 = -17$

21) $-3e^{7a+9} + 6 = -6$

22) $-3e^{9x-1} + 6 = -58$

23) $-e^{6-9p} + 5 = -48.4$

24) $-10e^{2-2b} - 6 = -66$

25) $6e^{-4k-10} - 4 = 63$

26) $6e^{5x-6} - 4 = 50$