HW 2.6

Unit 2 Mid Review -- Logarithmic and Exponential Functions

Converting Between Logarithmic and Exponential Forms

Rewrite in logarithmic form.

1. $6^3 = 216$ $\log_6 216 = 3$

2. $7^2 = 49$ $\log_7 49 = 2$

Rewrite in exponential form.

3. $\log_3 9 = 2$ $3^2 = 9$

4. $\ln 7 = 1.946$ $e^{1.946} = 7$

Applying Properties of Logarithms

Expand each logarithm.

5. $\log_3 \left(\frac{u^3}{v}\right)^2 = \log_3 \frac{u^6}{v^2} = 6\log_3 u - 2\log_3 v$

6. $\log \sqrt[3]{\frac{x}{y^6 z^9}} = \frac{1}{3}\left(\log x - 6\log y - 9\log z\right)$

Condense each logarithm.

7. $8\log_3 12 + 2\log_3 5$ $\log_3 (12^8 \cdot 5^2)$

8. $3\ln x + 2\ln y - \ln(x-1) - 2\ln z$ $\ln \frac{x^3 y^2}{z^2(x-1)}$

Evaluating Logarithms

9. $\log_2 8$ 3

10. $\log 56$ 1.748

11. $\ln 12$ 2.485

12. $\log_4 0.25$ -1

Solving Logarithmic Equations

13. $\log_9 x = 2$ $x = 81$

14. $\log_3(2x + 7) = 4$ $x = \frac{3^4 - 7}{2} = 37$

15. $\log_x 16 = 2$ $x^2 = 16$ $x = \pm 4$ $\boxed{x = 4}$

16. $\log_8(6x - 4) = \log_8(2x + 12)$
$6x - 4 = 2x + 12$
$4x = 16 \quad x = 4$

17. $\ln(x + 1) = 9$ $e^9 - 1 = x = 8102.08$

18. $\ln(2x - 8) = 3$ $\frac{e^3 + 8}{2} = x = 14.043$

19. $\log_4 3x^2 + \log_4 2x = 4$ $4^4 = 6x^3 \quad x = 3.494$

20. $\log x^2 - \log 3x = 2$ $10^2 = \frac{x}{3} \quad x = 300$

Solving Exponential Equations

21. $5^x = 22$ $x = \log_5 22 = 1.921$

22. $3^{2x} - 6 = 17$ $3^{2x} = 23$ $x = \frac{\log_3 23}{2} = 1.427$

23. $2 \cdot 9^x = 100$
$9^x = 50 \quad x = \log_9 50 = 1.780$

24. $e^{3x} = 11$ $x = \frac{\ln 11}{3} = .799$

25. $7^{x+3} = 40$ $x = (\log_7 40) - 3 = -1.104$

26. $10^x = 4^{2x-3}$
$(x)\ln 10 = (2x-3)\ln 4$
$x\ln 10 = 2x\ln 4 - 3\ln 4$
$x(\ln 10 - 2\ln 4) = -3\ln 4$
$x = \frac{-3\ln 4}{\ln 10 - 2\ln 4} = 8.849$