Name_____ Date_____ Period_____

Properties: $\ln x = \log_e x$ $\qquad \log_a x = \dfrac{\log_b x}{\log_b a}$ $\qquad$ If $b^y = x$, then $\log_b x = y$

$\qquad\qquad\qquad\qquad\qquad\qquad\qquad\qquad\qquad\qquad\qquad \log_b b^x = x \qquad\qquad\qquad \ln e^x = x$

Solve the exponential equation. Check for extraneous solutions. Round the result to three decimal places if necessary.

1. $5^x = 12$

6. $10^{x+2} - 12 = 22$

2. $4^x - 6 = 4$

7. $7^{2x-3} - 4 = 14$

3. $3e^{3x} = 12$

8. $3(2^{x+6}) = 17$

4. $10^{2x-3} + 3 = 19$

9. $4e^{3x} - 8 = -6$

5. $3e^x + 7 = 9$

10. $10^{2x+1} + 2 = 2$

Solve the logarithmic equation. Check for extraneous solutions. Round the result to three decimal places if necessary.

11. $7 - \log_3 (8x) = 2$

16. $4 + \log_9(3x - 7) = 6$

12. $2 \log_2(1 - 2x) = 12$

17. $\log_2 (2x) + \log_2 x = 5$

18. $\log_6(2x - 6) + \log_6 x = 2$

13. $3 \ln x - 7 = 4$

19. $\ln (3x) - \ln 2 = 4$

14. $\ln(1 - 3x) + 3 = 9$

20. $3\log_5 x - \log_5(5x) = 3 - \log_5 25$

15. $\log (7x) + 4 = 5$