

EXPONENTIAL/LOGARITHMIC EQUATIONS: SOLVING

Name Key

Period _____ Date _____

Solve each equation. Check for extraneous solutions where necessary, and round non-integer answers to the nearest thousandth.

1. $e^{x-2} = 14$

$$\ln e^{x-2} = \ln 14$$

$$x-2 = \ln 14$$

$$x = \ln 14 + 2$$

2. $2e^{2-3x} - 3 = 11$

$$2e^{2-3x} = 14$$

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

$$\ln e^{2-3x} = \ln 7$$

$$2-3x = \ln 7$$

$$-3x = \ln 7 - 2$$

$$x = \frac{\ln 7 - 2}{-3}$$

3. $2^x = 22$

$$\log_2 2^x = \log_2 22$$

$$x = \log_2 22$$

4. $27^x = 3^{2x+3}$

$$3^{3x} = 3^{2x+3}$$

$$3x = 2x + 3$$

$$x = 3$$

5. $4^{4x+2} = 54$

$$\log_4 4^{4x+2} = \log_4 54$$

$$4x+2 = \log_4 54$$

$$4x = (\log_4 54) - 2$$

$$x = \frac{(\log_4 54) - 2}{4}$$

6. $16^{x-5} = \left(\frac{1}{2}\right)^{2x-1}$

$$2^{4(x-5)} = 2^{-1(2x-1)}$$

$$4x-20 = -2x+1$$

$$6x = 21$$

$$x = 21/6$$

7. $\ln(2-x) = 3$

$$e^{2-x} = e^3$$

$$-x = e^3 - 2$$

$$x = -e^3 + 2$$

10. $2\log_7(1-x) = \log_7(7-x)$

$$\log_7(1-x)^2 = \log_7(7-x)$$

$$(1-x)^2 = 7-x$$

$$1 - 2x + x^2 = 7-x$$

$$x^2 - x - 6 = 0$$

$$(x-3)(x+2) = 0$$

$$x = 3 \quad x = -2$$

8. $\log_2 x + \log_2(x+1) = 1$

$$\log_2[x(x+1)] = 1$$

$$x(x+1) = 2$$

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

$$(x+2)(x-1) = 0$$

$$x = -2 \quad x = 1$$

11. $\log_2(x-3) + \log_2(x+1) = \log_2(6x-18)$

$$\log_2[(x-3)(x+1)] = \log_2(6x-18)$$

$$(x-3)(x+1) = 6x-18$$

$$x^2 - 2x - 3 = 6x - 18$$

$$x^2 - 8x + 15 = 0$$

$$(x-3)(x-5) = 0$$

$$x = 3 \quad x = 5$$

9. $\log_4(x-3) + \log_4(x-4) = \frac{1}{2}$

$$\log_4[(x-3)(x-4)] = \frac{1}{2}$$

$$x^2 - 7x + 12 = 2$$

$$x^2 - 7x + 10 = 0$$

$$(x-5)(x-2) = 0$$

$$x = 5 \quad x = 2$$

12. ~~$\log_2(7x-8) = \log_2(x+1) - \log_2(x-1) = 1$~~