

Name: Homework Guide

Date: _____

Solve the following logarithmic functions [be sure to check your answers!]:

1. $\log_2(4x) = 5$

$$\frac{2}{2} \quad \frac{2}{2}$$

$$4x = 2^5$$

$$\frac{4x}{4} = \frac{32}{4}$$

$$x = 8$$

2. $\log_6(5x+11) + 5 = 8$

$$x = 41$$

3. $\log_5(3x-7) = \log_5(7x-21)$

$$\frac{3x-7}{-3x} = \frac{7x-21}{-3x}$$

$$\frac{-7}{+21} = \frac{4x-21}{+21}$$

$$\frac{4x}{4} = \frac{-14}{4}$$

$$x = -\frac{14}{4} = -\frac{7}{2}$$

4. $\log_3(x) + \log_3(x-6) = 3$

$$x = 9 \text{ \& } x = -3$$

5. $\log_4(192) - \log_4(3x) = 2$

$$x = 4$$

6. $\log_3(x^2+3x) = \log_3(x+15)$

$$\frac{x^2+3x}{-x-15} = \frac{x+15}{+15}$$

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

$$(x+5)(x-3)$$

$$x = -5 \text{ \& } x = 3$$

7. $\log_2(4x) - \log_2(x-2) = 3$

$$2 \log_2 \frac{4x}{x-2} = 3 \quad [\text{Condense!}]$$

$$\frac{4x}{x-2} = \frac{8}{1} \quad \rightarrow \quad \frac{-4x}{-4} = \frac{-16}{-4}$$

$$4x(1) = 8(x-2)$$

$$4x = 8x - 16$$

$$-8x \quad -8x$$

$$x = 4$$

8. $\log_4(x-15) - \log_4(x) = 2$

$$x = -1 \quad \boxed{\text{No solution}}$$

9. $\log_2(2x) + \log_2(x-2) = 4$

$$2 \log_2 2x \cdot (x-2) = 4$$

$$2x^2 - 4x = 16$$

$$2x^2 - 4x - 16 = 0$$

$$2(x^2 - 2x - 8) = 0$$

$$2(x-4)(x+2) = 0$$

$$x = 4 \quad \& \quad x = -2$$

10. $\log_3(x) + \log_3(x-1) = \log_3(3x+12)$

$$x = 6$$

$$\&$$

$$x = -2$$

Review solving exponentials

11. $\frac{3e^x}{3} = \frac{60}{3}$

$$\ln e^x = \ln 20$$

$$x = \ln 20$$

$$x = 2.996$$

12. $5^x + 2 = 10$

$$x = 1.292$$

13. $8^{x+1} = \left(\frac{1}{2}\right)^x$

$$(2^3)^{x+1} = (2^{-1})^x$$

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

$$3x + 3 = -x$$

$$-3x \quad -3x$$

$$3 = -4x$$

$$x = -\frac{3}{4}$$

14. $3(2)^{2x} - 10 = 122$

$$x = 2.730$$