

Name: Answers

Date: _____

Homework: Exponential and Logarithmic Equations (Day 1)**Honors PreCalculus**

1. $8^{5x} = 16^{3x+4}$

$$(2^3)^{5x} = (2^4)^{3x+4}$$

$$2^{15x} = 2^{12x+16}$$

$$15x = 12x + 16$$

$$3x = 16$$

$$\boxed{x = \frac{16}{3}}$$

2. $\frac{1}{4}(4)^{2x} + 1 = 5$

$$4 \cdot \frac{1}{4}(4)^{2x} = 4 \cdot 4$$

$$4^{2x} = 16$$

$$4^{2x} = 4^2$$

$$2x = 2$$

$$\boxed{x = 1}$$

3. $10^{-12x} + 6 = 100$

$$10^{-12x} = 94$$

$$\log 94 = -12x$$

$$1.973 = -12x$$

$$\boxed{-.164 = x}$$

4. $-16 + 0.2(10)^x = 35$

$$.2(10)^x = 51$$

$$10^x = 255$$

$$\log 255 = x$$

$$\boxed{2.407 = x}$$

5. $\ln(4x + 1) = \ln(2x + 5)$

$$4x + 1 = 2x + 5$$

$$2x + 1 = 5$$

$$2x = 4$$

$$\boxed{x = 2}$$

6. $2 \log x = \log 2 + \log(3x - 4)$

$$0 = \log 2 + \log(3x - 4) - 2 \log x$$

$$0 = \log \frac{2(3x-4)}{x^2}$$

$$10^0 = \frac{2(3x-4)}{x^2}$$

$$x^2 \cdot 1 = \frac{2(3x-4)}{x^2} \cdot x^2$$

$$x^2 = 2(3x-4)$$

$$x^2 = 6x - 8$$

$$x^2 - 6x + 8 = 0$$

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

$$\boxed{x = 4, 2}$$

$$7. 4 \log_5(x+1) = 4.8$$

$$\log_5(x+1) = 1.2$$

$$5^{1.2} = x+1$$

$$6.899 = x+1$$

$$\boxed{5.899 = x}$$

$$8. -5 + 2 \ln 3x = 5$$

$$2 \ln 3x = 10$$

$$\ln 3x = 5$$

$$e^5 = 3x$$

$$148.413 = 3x$$

$$\boxed{49.471 = x}$$

$$9. 4 \ln(2x+3) = 11$$

$$\ln(2x+3) = \frac{11}{4}$$

$$e^{\frac{11}{4}} = 2x+3$$

$$15.643 = 2x+3$$

$$12.643 = 2x$$

$$\boxed{6.321 = x}$$

$$10. \ln x + \ln(x+3) = 1$$

$$\ln(x(x+3)) = 1$$

$$e^1 = x(x+3)$$

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

$$0 = x^2 + 3x - e$$

$$x = \frac{-3 \pm \sqrt{3^2 - 4(1)(-e)}}{2(1)}$$

$$x = \frac{-3 \pm \sqrt{19.873}}{2}$$

$$x = \frac{-3 \pm 4.458}{2}$$

$$\boxed{x = .729} \quad x \neq -3.729$$