

REVIEW - SOLVING EXPONENTIAL AND LOG EQUATIONS

Name: _____

key

Date: _____

STRATEGY:

Solve each equation. Show work.

1. $2^{x+6} = 4$

-4

$2^{x+6} = 2^2$

$x+6 = 2$

$x = -4$

$\ln 2^{x+6} = \ln 4$

$(x+6)\ln 2 = \ln 4$

$x \ln 2 + 6 \ln 2 = \ln 4$

$x \ln 2 = \ln 4 - 6 \ln 2$

$x = \frac{\ln 4 - 6 \ln 2}{\ln 2}$

3. $5^{x^2+1} = 10$

$\pm .6563$

$\ln 2$

$\log 5^{x^2+1} = \log 10$ $x = -4$

$(x^2+1)\log 5 = 1$

$x^2 \log 5 + \log 5 = 1$

$x^2 \log 5 = 1 - \log 5$

$x^2 = \frac{1 - \log 5}{\log 5}$

5. $\log_2 4 - \log_2(x+3) = \log_2 8$

$x = \pm .6563$

$\log_2 \frac{4}{x+3} = \log_2 8$

$\frac{4}{x+3} = \frac{8}{1}$

$8x + 24 = 4$

$8x = -20$

$x = \frac{-20}{8} = \frac{-5}{2}$

2. $243^{2x} = 81^{x+5}$

~~$\frac{10}{3}$~~ $\frac{-20}{3}$

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

~~$x = 4x + 20$~~

$-20 = 3x$

~~$-3x = 20$~~

$x = \frac{20}{-3} = \frac{-20}{3}$

$\frac{-20}{3}$

4. $6^{x-5} = 2^{7x+3}$

-3.61

$(x-5)\ln 6 = (7x+3)\ln 2$

$x \ln 6 - 5 \ln 6 = 7x \ln 2 + 3 \ln 2$

$x \ln 6 - 7x \ln 2 = 5 \ln 6 + 3 \ln 2$

$x(\ln 6 - 7 \ln 2) = 5 \ln 6 + 3 \ln 2$

$x = \frac{5 \ln 6 + 3 \ln 2}{\ln 6 - 7 \ln 2}$

6. $\log_3(x+6) + \log_3(x-6) = 2$

~~$x = -3.6$~~

check

$6^{-9.1924} =$

$2^{-26.3468}$

$\log_3(x^2-36) = 2$

$3^2 = x^2 - 36$

$9 = x^2 - 36$

$0 = x^2 - 45$

$x = \pm \sqrt{45} = \pm 3\sqrt{5}$

$3\sqrt{5}$

$$7. \log_6 x = \frac{3}{2} \log_6 9 + \log_6 2$$

$$\log_6 x = \log_6 9^{\frac{3}{2}} + \log_6 2$$

$$\log_6 x = \log_6 27 + \log_6 2$$

$$\log_6 x = \log_6 54$$

$$x = 54$$

$$9. e^{4x} - 5e^{2x} + 6 = 0$$

$$(e^{2x} - 3)(e^{2x} - 2) = 0$$

$$e^{2x} = 3 \quad e^{2x} = 2$$

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

$$2x = \ln 3$$

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

$$x = .5493$$

$$2x = \ln 2$$

$$x = \frac{\ln 2}{2}$$

$$x = .3466$$

$$8. \log_2(2x+8) - \log_2(2x^2+21x+61) = -3$$

$$\log_2 \left(\frac{2x+8}{2x^2+21x+61} \right) = \frac{-3}{1}$$

$$2^{-3} = \frac{2x+8}{2x^2+21x+61}$$

$$\frac{1}{8} = \frac{2x+8}{2x^2+21x+61}$$

$$16x+64 = 2x^2+21x+61$$

$$0 = 2x^2+5x-3$$

$$10. 56e^{0.4x} - 2 = 456$$

$$0 = (2x-1)(x+3)$$

$$x = \frac{1}{2} \quad x = -3$$

$$56e^{.4x} = 458$$

$$e^{.4x} = \frac{458}{56}$$

$$.4x = \ln \left(\frac{458}{56} \right)$$

$$.4x = \ln 458 - \ln 56$$

$$x = \left(\ln 458 - \ln 56 \right)$$

$$\div .4$$

$$x = 5.2538$$