Name Schlansky
Mr. Schlansky

Date _____
Pre Calculus

Exponential and Logarithm Equations Practice

Solve the following equations for all values of x and round to the nearest tenth if necessary

1. $2\log_4 x - \log_4(x-1) = 1$

exponential form

$\log_4 \frac{x^2}{x-1} = 1$

$4^1 = \frac{x^2}{x-1}$

$(x-1)(4) = \left(\frac{x^2}{x-1}\right)(x-1)$

$4x-4 = x^2$

$-4x+4 \quad -4x+4$

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

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

$x=2 \quad x=2$

2. $27^x = 9^{x+2}$

common exponential base

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

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

$3x = 2x+4$

$-2x \quad -2x$

$x=4$

3. $1.2(3)^{-2x} + 15 = 195$

log of both sides

$-15 \quad -15$

$\frac{1.2(3)^{-2x}}{1.2} = \frac{180}{1.2}$

$\log 3^{-2x} = \log 150$

$\frac{-2x\log 3}{-2\log 3} = \frac{\log 150}{-2\log 3}$

$x = -2.9$

4. $2x^{\frac{2}{3}} - 1 = 17$

reciprocal power

$+1 \quad +1$

$\frac{2x^{\frac{2}{3}}}{2} = \frac{18}{2}$

$\left(x^{\frac{2}{3}}\right)^{3/2} = (9)^{3/2}$

$x = 27$

cancel logs

5. $\log_3 2+2\log_3 x=\log_3(7x-3)$

$\log_3(2x^2)=\log_3(7x-3)$

$2x^2=7x-3$

$-7x+3\quad -7x+3$

$2x^2-7x+3=0$

$(2x^2-6x)-(1x-3)=0$

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

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

$2x-1=0 \quad x-3=0$

$+1+1 \quad +3+3$

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

$x=\frac{1}{2}$

extraneous solution

reciprocal power

6. $5x^{\frac{3}{4}}+4=131$

$-4\quad -4$

$\frac{5x^{\frac{3}{4}}}{5}=\frac{127}{5}$

$\left(x^{\frac{3}{4}}\right)^{\frac{4}{3}}=25.4^{\frac{4}{3}}$

$x=74.7$

7. $\log\left(x+\frac{3}{10}\right)+\log x+1=0$

$-1\quad -1$

$\log x\left(x+\frac{3}{10}\right)=-1$

$10^{-1}=x\left(x+\frac{3}{10}\right)$

$10\left(\frac{1}{10}\right)=10\left(x^2+\frac{3x}{10}\right)$

$1=10x^2+3x$

$-1\quad -1$

$0=10x^2+3x-1$

$\frac{10x^2+5x-2x-1}{5x}=\frac{0}{5x}$

$5x(2x+1)-1(2x+1)=0$

$(5x-1)(2x+1)=0$

$5x-1=0 \quad 2x+1=0$

$+1+1 \quad -1-1$

$\frac{5x}{5}=\frac{1}{5} \quad \frac{2x}{2}=\frac{-1}{2}$

$x=\frac{1}{5} \quad x=-\frac{1}{2}$

log both sides

cancel logs

8. $\log_8(x-40)-\log_8(x-10)=\log_8(x+2)$

$\log_8\frac{x-40}{x-10}=\log_8(x+2)$

$\left(\frac{x-40}{x-10}\right)(x-10)=(x+2)(x-10)$

$x-40=x^2-10x+2x-20$

$x-40=x^2-8x-20$

$-x+40\quad -x+40$

$0=x^2-9x+20$

$0=(x-5)(x-4)$

$x=5 \quad x=4$

No solution

9. $256+3(2)^{6x}=2700$

$-256\quad -256$

$\frac{3(2)^{6x}}{3}=\frac{2444}{3}$

$\log 2^{6x}=\log 814.\overline{6}$

$6x\log 2=\log 814.\overline{6}$

$\frac{6x\log 2}{6\log 2}=\frac{\log 814.\overline{6}}{6\log 2}$

$x=1.\overline{6}$

common exponential base

10. $4^{2b-3}=8^{1-b}$

$(2^2)^{2b-3}=(2^3)^{1-b}$

$2(2b-3)=3(1-b)$

$4b-6=3-3b$

$+3b\quad +3b$

$7b-6=3$

$+6\quad +6$

$\frac{7b}{7}=\frac{9}{7}$

$b=\frac{9}{7}$