

Solve. Check for extraneous solutions.

1.) $4^{5x-1} = 16^{2x-1}$
 $4^{5x-1} = (4^2)^{2x-1}$
 $5x-1 = 4x-2$
 $\begin{array}{r} -4x \\ -4x \end{array}$
 $x-1 = -2$
 $\begin{array}{r} +1 \\ +1 \end{array}$
 $x = -1$

2.) $e^{x^2-3} = e^{2x}$
 $x^2-3 = 2x$
 $x^2-2x-3 = 0$
 $(x-3)(x+1) = 0$
 $x = 3$ $x = -1$

3.) $\log_4 16 = y$
 $\frac{\log 16}{\log 4} = y$
 $2 = y$

4.) $\log(5-2x) = \log(3x+1)$
 $5-2x = 3x+1$
 $\begin{array}{r} +2x \\ +2x \end{array}$
 $5 = 5x+1$
 $\begin{array}{r} -1 \\ -1 \end{array}$
 $\frac{4}{5} = \frac{5x}{5}$ $x = \frac{4}{5}$

5.) $(\frac{1}{5})^{x+1} = 125$
 $(5^{-1})^{x+1} = 5^3$
 $-x-1 = 3$
 $\begin{array}{r} +1 \\ +1 \end{array}$
 $-x = 4$
 $x = -4$

6.) $e^x + 5 = 50$
 $e^x = 45$
 $\ln 45 = x$
 $x = 3.81$

7.) $4^{2x-7} = 64$
 $4^{2x-7} = 4^3$
 $2x-7 = 3$
 $\frac{2x}{2} = \frac{10}{2}$
 $x = 5$

8.) $8^{-2-x} = 431$
 $\log_8 431 = -2-x$
 $\frac{\log 431}{\log 8} = -2-x$
 $2.917 = -2-x$
 $\begin{array}{r} +2 \\ +2 \end{array}$
 $x = -4.917$

9.) $5^{x-1} = 7$
 $\log_5 7 = x-1$
 $\frac{\log 7}{\log 5} = x-1$
 $1.209 = x-1$
 $\begin{array}{r} +1 \\ +1 \end{array}$
 $x = 2.209$

10.) $\log_4 x = \frac{1}{2}$
 $4^{1/2} = x$
 $\sqrt{4} = x$
 $x = 2, x = -2$ *extraneous*
 $x = 2$

11.) $6^{5x-2} = 348$
 $\log_6 348 = 5x-2$
 $\frac{\log 348}{\log 6} = 5x-2$
 $3.266 = 5x-2$
 $\begin{array}{r} +2 \\ +2 \end{array}$
 $5.266 = 5x \rightarrow x = 1.053$

12.) $4^{x+2} - 2 = 12$
 $\begin{array}{r} +2 \\ +2 \end{array}$
 $4^{x+2} = 14$
 $\log_4 14 = x+2$
 $\frac{\log 14}{\log 4} = x+2$
 $1.904 = x+2$
 $\begin{array}{r} -2 \\ -2 \end{array}$
 $x = -.096$

13.) $\log_3 x^2 = 2$
 $3^2 = x^2$
 $\sqrt{9} = \sqrt{x^2}$
 $x = 3$

14.) $4^{5x-x^2} = 4^{-6}$
 $5x-x^2 = -6$
 $\begin{array}{r} -5x \\ +x^2 \end{array} \quad \begin{array}{r} -5x \\ +x^2 \end{array}$
 $x^2 - 5x - 6 = 0$
 $(x-6)(x+1) = 0$
 $x = 6$ $x = -1$

15.) $2^{x-3} = 32$
 $2^{x-3} = 2^5$
 $x-3 = 5$
 $\begin{array}{r} +3 \\ +3 \end{array}$
 $x = 8$

16.) $\ln(x+4) - \ln(x-2) = \ln x$

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

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

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

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

$x^2 - 3x - 4 = 0$

$(x-4)(x+1) = 0$

$x=4$

~~$x=-1$~~ extraneous

17.) $\log_4(2x^2 - 4x - 6) = \log_4(-5x - 12)$

$2x^2 - 4x - 6 = -5x - 12$

$+5x + 12 \quad +5x + 12$

~~$\frac{12}{1}$~~

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

$a=2, b=1, c=6$

$x = \frac{-1 \pm \sqrt{(1)^2 - 4(2)(6)}}{2(2)}$

NO Real solutions

18.) $e^{3x} = 12$

$\ln 12 = 3x$

$\frac{2.485}{3} = \frac{3x}{3}$

$x = 0.83$

19.) $\ln x = -3$

$e^{-3} = x$

$0.0498 = x$

20.) $\log(x-3) + \log x = 1$

$\log(x-3) \cdot x = 1$

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

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

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

$x=5$

~~$x=-2$~~ extraneous

21.) $\ln(x-2) + \ln(2x-3) = 2 \ln x$

$\ln(x-2)(2x-3) = \ln x^2$

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

$2x^2 - 3x - 4x + 6 = x^2$

$x^2 - 7x + 6 = 0$

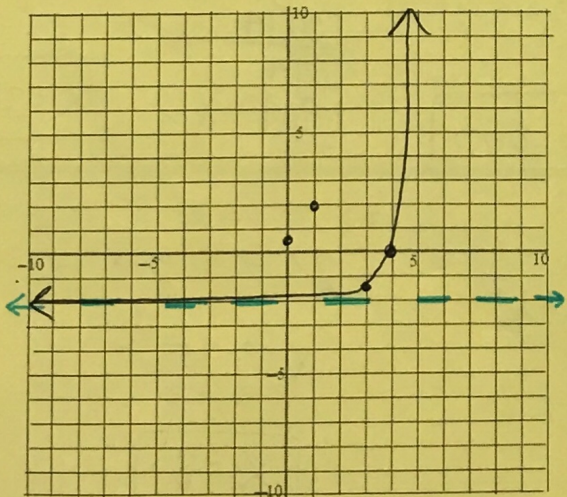
$(x-6)(x-1) = 0$

$x=6$

~~$x=1$~~ extraneous

Graph. State all important information.

22.) $y = \left(\frac{1}{2}\right)(4)^{x-3} - 2$



Growth/Decay: growth

Domain: $(-\infty, \infty)$

Range: $(-2, \infty)$

Asymptote: $y = -2$

Real Solutions: _____

End Behavior: As $x \rightarrow \infty$, $y \rightarrow \infty$

As $x \rightarrow -\infty$, $y \rightarrow -2$