



Advanced Math

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$$52) 5^{x-1} = 7$$

$$\ln 5^{x-1} = \ln 7$$

$$x-1 = \frac{\ln 7}{\ln 5}$$

$$\{2.209\}$$

$$54) \frac{3000}{2} = 2 + e^{2x}$$

$$1498 = e^{2x}$$

$$\ln 1498 = \ln e^{2x}$$

$$\frac{\ln 1498}{2} = x$$

$$\{3.656\}$$

$$56) \ln x = 2$$

$$e^2 = x$$

$$\{7.389\}$$

$$58) \ln 5x = \frac{10}{3}$$

$$e^{10/3} = 5x$$

$$\frac{e^{10/3}}{5} = x$$

$$\{5.606\}$$

$$60) \sqrt{e^2} = \sqrt{(x+1)^2}$$

$$\pm e = x+1$$

$$-1 \pm e = x$$

$$\{-3.718, 1.718\}$$

$$62) \sqrt{10^6} = \sqrt{x^2}$$

$$\pm 10^3 = x$$

$$\{\pm 1000\}$$

$$64) \ln[x(x+3)] = 1$$

$$e^1 = x^2 + 3x$$

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

$$.729, -3.729$$

domain (0,∞)

$$\{.729\}$$

$$4) \log_4 x - \log_4(x-1) = \frac{1}{2}$$

$$\log_4\left(\frac{x}{x-1}\right) = \frac{1}{2}$$

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

$$2x-2 = x$$

$$\{2\}$$

$x-2=0$
 $x=2$

$$66) \log_2(x^2 + 2x) = \log_2(x+6)$$

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

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

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

$$\{2\}$$

$$70) \ln(x+1) - \ln(x-2) = \ln x^2$$

$$\ln(x+1) = \ln x^2 + \ln(x-2)$$

$$\ln(x+1) = \ln(x^3 - 2x^2)$$

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

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

$$\{2.547\} \text{ (true)}$$

$$72) 5 \log_{10}(x-2) = 11$$

$$\log_{10}(x-2) = \frac{11}{5}$$

$$10^{11/5} = x-2$$

$$2 + 10^{11/5} = x$$

$$\{160.489\}$$

$$74) \ln 4x = 1$$

$$e^1 = 4x$$

$$\{.680\}$$

$$76) \log_{10} 8x - \log_{10}(1 + \sqrt{x}) = 2$$

$$\log_{10}\left(\frac{8x}{1 + \sqrt{x}}\right) = 2$$

$$10^2 = \frac{8x}{1 + \sqrt{x}}$$

$$100 + 100\sqrt{x} = 8x$$

$$0 = 8x - 100\sqrt{x} - 100$$

$$\sqrt{x} = 13.4307 \text{ or } \sqrt{x} = -9.307 \text{ (quadratic)}$$

$$x = 180.384 \quad x = -86$$

$$\{180.384\}$$

$$78) 2.197 \quad 80) 14.182$$

$$82) 2000 = 1000 e^{.12t}$$

$$2 = e^{.12t}$$

$$5.776 \text{ years}$$

$$86) 3000 = 1000 e^{.12t}$$

$$3 = e^{.12t}$$

$$9.155 \text{ years}$$

$$87) a) 1425.946$$

$$\approx 1426 \text{ products}$$

$$b) 1497.866$$

$$\approx 1498 \text{ products}$$

$$88) a) 303.068$$

$$b) 528.026$$

$$89) b) y = 61.7 \text{ million}$$

$$c) 29.333 \text{ years}$$

$$90) 12.757$$