

Sec 3.4 Solve Exponential & Log Eqn pg 254, 3, 9, 15-60 (x3) 81-96 odd

#3) $3e^{x+2} = 75$

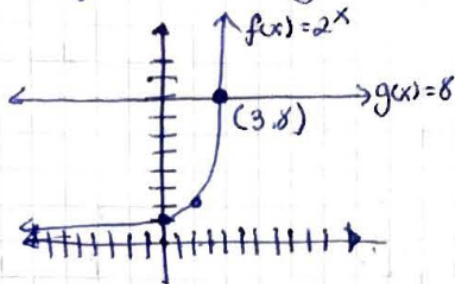
a) $3e^{(-2+e^{25}+2)} = 75$
 $3e^{e^{25}} \neq 75$ Not a soln.

b) $3e^{(-2+\ln 5+2)} = 75$
 $3e^{\ln 5} = 75$

$3(5) = 75$ Yes it's
 $75 = 75$ a soln

c) $3e^{(1.2189+2)} = 75$
 $3e^{3.2189} \approx 75$
 Yes it's a soln

#9) $f(x) = 2^x$ & $g(x) = 8$



| x | y |
|---|---|
| 0 | 1 |
| 1 | 2 |
| 3 | 8 |

$8 = 2^x$
 $2^3 = 8$

$2^x = 8$
 $2^x = 2^3$

$x = 3$

#15) $4^x = 16$
 $4^x = 4^2$
 $x = 2$

#18) $7^x = \frac{1}{49}$
 $7^x = 49^{-1}$
 $7^x = 7^{-2}$
 $x = -2$

#21) $(\frac{1}{4})^x = 64$
 $4^{-x} = 4^3$
 $-x = 3$
 $x = -3$

#24) $\ln x - \ln 2 = 0$
 $e^{\ln \frac{x}{2}} = e^0$
 $\frac{x}{2} = 1$
 $x = 2$

#27) $e^x = 4$
 $\ln e^x = \ln 4$
 $x = \ln 4$
 $x \approx 1.39$

#30) $\log_4 x = 3$
 $x = 4^3$
 $x = 64$

#33) $\log_{10} x = -1$
 $x = 10^{-1}$
 $x = \frac{1}{10}$

#36) $\ln(3x+5) = 8$
 $e^{\ln(3x+5)} = e^8$
 $3x+5 = e^8$
 $3x = -5 + e^8$
 $x = \frac{-5 + e^8}{3}$
 $x \approx 999.99$

#39) $e^{\ln(5x+2)}$
 $5x+2$

#42) $-8 + e^{\ln x^3}$
 $-8 + x^3$

#45) $e^x = 10$
 $\ln e^x = \ln 10$
 $x = \ln 10$
 $x \approx 2.30$

#48) $4^{-3t} = 0.10$
 $4^{-3t} = \frac{1}{10}$
 $\ln 4^{-3t} = \ln \frac{1}{10}$

$-3t \ln 4 = -\ln 10$
 $3t = \frac{-\ln 10}{-\ln 4}$

$t = \frac{1.661}{3} \approx 0.554$

$$\#51) \frac{500e^{-x}}{500} = \frac{300}{500}$$

$$\ln e^{-x} = \ln \frac{3}{5}$$

$$-x = \ln \frac{3}{5}$$

$$x = -\ln \frac{3}{5}$$

$$\boxed{x \approx 0.511}$$

$$\#54) \frac{-14 + 3e^x}{+14} = \frac{11}{+14}$$

$$\frac{3e^x}{3} = \frac{25}{3}$$

$$\ln e^x = \ln \frac{25}{3}$$

$$x = \ln \frac{25}{3}$$

$$\boxed{x \approx 2.0120}$$

$$\#57) \frac{50(120 - e^{x/2})}{50} = \frac{600}{50}$$

$$\frac{120 - e^{x/2}}{-120} = \frac{12}{-120}$$

$$-e^{x/2} = -108$$

$$\ln e^{x/2} = \ln 108$$

$$\frac{x}{2} = \ln 108$$

$$x = 2 \ln 108$$

$$\boxed{x \approx 9.364}$$

$$\#60) \left(16 + \frac{0.878}{26}\right)^{3t} = 30$$

$$y = \left(16 + \frac{0.878}{26}\right)^{3t} - 30$$

graph on calc or Desmos and identify x -int

$$\boxed{t \approx 0.409}$$

$$\#81) \ln 4x = 2.1$$

$$4x = e^{2.1}$$

$$x = \frac{e^{2.1}}{4}$$

$$\boxed{x \approx 2.042}$$

$$\#83) 2 \ln 3x = 19$$

$$\ln 3x = 9.5$$

$$3x = e^{9.5}$$

$$x = \frac{e^{9.5}}{3}$$

$$x \approx 4453.242$$

$$\#85) \log_{10}(z-3) = 2$$

$$z-3 = 10^2$$

$$z-3 = 100$$

$$+3 \quad +3$$

$$\boxed{z = 103}$$

$$\#87) 7 \log_4(0.6x) = 12$$

$$\log_4(0.6x) = \frac{12}{7}$$

$$0.6x = 4^{12/7}$$

$$x = \frac{4^{12/7}}{0.6}$$

$$\boxed{x \approx 17.945}$$

$$\#89) \ln \sqrt{x+2} = 1$$

$$e^{\sqrt{x+2}} = e^2$$

$$\sqrt{x+2} = e$$

$$x+2 = e^2$$

$$x = e^2 - 2$$

$$\boxed{x \approx 5.389}$$

$$\#91) \ln(x+1)^2 = 2$$

$$(x+1)^2 = e^2$$

$$x+1 = \pm e$$

$$x = -1 + e \quad x = -1 - e$$

$$\boxed{x \approx 1.718, \quad x \approx -3.718}$$

$$\#93) \log_4 x - \log_4(x-1) = \frac{1}{2}$$

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

$$\frac{x}{x-1} = 2 \Rightarrow \frac{x-2}{x-1} = 2 \Rightarrow -x = -2 \Rightarrow \boxed{x = 2}$$

$$\#95) \ln(x+5) = \ln(x-1) - \ln(x+1)$$

$$\ln(x+5) = \ln \frac{(x-1)(x+1)}{x+1}$$

$$\frac{x+5}{1} = \frac{x-1}{x+1}$$

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

$$x^2 + 6x + 5 = x-1$$

$$x^2 + 5x + 6 = 0$$

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

$$\boxed{x = -2, \quad x = -3}$$