

HW 25 Solutions

5.5.1. $\log_3(5) = x$

$$x = \frac{\log(5)}{\log(3)} \approx \frac{0.7}{0.5} \approx 1.4$$

5.5.4. $\log_3(-20) = x + 7$

Does not exist

5.5.7. $8^{4x-7} = 11^{5+x}$

$$(4x-7) \log(8) = (5+x) \log(11)$$

$$4x \log(8) - 7 \log(8) = 5 \log(11) + x \log(11)$$

$$4x \log(8) - x \log(11) = 7 \log(8) + 5 \log(11)$$

$$x = \frac{7 \log(8) + 5 \log(11)}{4 \log(8) - \log(11)} = \frac{\log(8^7 \cdot 11^5)}{\log(8^4 \cdot 11^{-1})} \approx \frac{11.5}{2.6} \approx 4.4$$

5.5.8. $x = 3(9^{x-1}) = 81^{2x+1}$

$$x \log_3(3(9^{x-1})) = \log_3(81^{2x+1})$$

$$\log_3(3) + \log_3(9^{x-1}) = \log_3(81^{2x+1})$$

$$1 + (x-1) \log_3(9) = (2x+1) \log_3(81)$$

$$1 + (x-1)(2) = (2x+1)(4)$$

$$2x-1 = 8x+4$$

$$-5 = 6x$$

so $x = -\frac{5}{6}$

$$5.5.12 \quad 150 e^{x-4} = 5$$

$$e^{x-4} = \frac{1}{30}$$

$$x = 4 + \ln\left(\frac{1}{30}\right) \approx 0.6$$

$$\ln\left(\frac{1}{30}\right) = x - 4$$

5.5.21

~~$$\log(1-5x) = 2$$~~
$$\Rightarrow 10^2 = 1 - 5x$$

$$100 - 1 = -5x$$

$$\boxed{-\frac{99}{5} = x}$$

5.5.26

Note: This problem can't be solved as it is written.

It was thrown out. But I will solve what I

think the problem was supposed to be:

$$\log_7(x+9) = \log_7(x+15) - 1$$

$$\Rightarrow \log_7(x+9) = \log_7(x+15) - \log_7(7)$$

$$\Rightarrow \log_7(x+9) = \log_7\left(\frac{x+15}{7}\right)$$

$$x+9 = \frac{x+15}{7} \Rightarrow 7x + 63 = x + 15$$

$$20 = -6x$$

$$\boxed{x = -\frac{10}{3}}$$

$$5.5.29 \quad \ln(3) + \ln\left(x^2 + \frac{2x}{3}\right) = 0$$

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

$$\boxed{x = \frac{1}{3} \text{ or } -1}$$

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

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

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

check:

$$\ln(3) + \ln\left(1 - \frac{2}{3}\right) \text{ ok.}$$