

SOLUTIONS

pg 1ne

$$\textcircled{1} -8 + 5^{(3x+2)} = 10$$

Isolate:

$$5^{(3x+2)} = 18$$

$$\Rightarrow \ln(5^{(3x+2)}) = \ln(18)$$

$$\Rightarrow (3x+2) \cdot \ln(5) = \ln(18)$$

$$\Rightarrow 3x \ln(5) + 2 \ln(5) = \ln(18)$$

$$\Rightarrow 3x \ln(5) = \ln(18) - 2 \ln(5)$$

$$\Rightarrow x = \frac{(\ln(18) - 2 \ln(5))}{(3 \ln(5))}$$

$$= \boxed{3.061}$$

$$\textcircled{2} 18^{(3x-1)} = 7^{(x+4)}$$

$$\Rightarrow \ln(18^{(3x-1)}) = \ln(7^{(x+4)})$$

$$\Rightarrow (3x-1) \cdot \ln(18) = (x+4) \cdot \ln(7)$$

$$\Rightarrow 3x \ln(18) - \ln(18) = x \ln(7) + 4 \ln(7)$$

$$\Rightarrow 3x \ln(18) - x \ln(7) = \ln(18) + 4 \ln(7)$$

$$\Rightarrow x (3 \ln(18) - \ln(7)) = \ln(18) + 4 \ln(7)$$

$$\Rightarrow x = \frac{(\ln(18) + 4 \ln(7))}{(3 \ln(18) - \ln(7))}$$

$$= \boxed{1.587}$$

NOTE CORRECTION

$$\textcircled{3} 4e^{(x+3)} + 7 = 35$$

Isolate:

$$\Rightarrow 4e^{(x+3)} = 28$$

$$\Rightarrow e^{(x+3)} = \frac{28}{4} = 7$$

$$\Rightarrow \ln(e^{(x+3)}) = \ln(7)$$

$$\Rightarrow x+3 = \ln(7)$$

$$\Rightarrow x = \boxed{-3 + \ln(7)}$$

$$= \boxed{-1.054}$$

$$\textcircled{4} \ln(5x) + 4 = 7$$

Isolate:

$$\Rightarrow \ln(5x) = 3$$

$$\Rightarrow e^{\ln(5x)} = e^3$$

$$\Rightarrow 5x = e^3$$

$$\Rightarrow x = \frac{e^3}{5}$$

$$\Rightarrow x = \boxed{4.017}$$

MUST CHECK!

$$\textcircled{5} \quad \ln(x-2) + \ln(x) = 2$$

Combine Logs

$$\Rightarrow \ln((x-2)(x)) = 2$$

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

$$\Rightarrow e^{\ln(x^2 - 2x)} = e^2$$

$$\Rightarrow x^2 - 2x = e^2$$

$$\Rightarrow x^2 - 2x - e^2 = 0$$

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

$$= \frac{2 \pm \sqrt{4 + 4e^2}}{2}$$

$$= \frac{2 + \sqrt{4 + 4e^2}}{2}$$

$$\text{or } \frac{2 - \sqrt{4 + 4e^2}}{2}$$

$$= \frac{2 + 5.793}{2}$$

$$\text{or } \frac{2 - 5.793}{2}$$

$$\Rightarrow \boxed{3.896}$$

check

$$\text{or } -1.896$$

Does NOT CHECK

$$\textcircled{6} \quad \ln(x-4) + \ln(x+3) = 1.4$$

$$\Rightarrow \ln((x-4)(x+3)) = 1.4$$

$$\Rightarrow \ln(x^2 - x - 12) = 1.4$$

$$\Rightarrow e^{\ln(x^2 - x - 12)} = e^{1.4}$$

$$\Rightarrow x^2 - x - 12 = e^{1.4}$$

$$\Rightarrow x^2 - x - 12 - e^{1.4} = 0$$

$$\Rightarrow x^2 - x + (-12 - e^{1.4}) = 0$$

$$a=1 \quad b=-1 \quad c = \uparrow$$

$$\Rightarrow x = \frac{-(-1) \pm \sqrt{(-1)^2 - 4(1)(-12 - e^{1.4})}}{2(1)}$$

$$= \frac{1 \pm \sqrt{1 - 4(-12 - e^{1.4})}}{2}$$

$$= \frac{1 + \sqrt{1 - 4(-12 - e^{1.4})}}{2}$$

$$\text{or } = \frac{1 - \sqrt{1 - 4(-12 - e^{1.4})}}{2}$$

$$= \frac{1 + \sqrt{1 - 4(-16.055)}}{2}$$

$$\text{or } \frac{1 - \sqrt{1 - 4(-16.055)}}{2}$$

$$= \frac{1 + 8.076}{2}$$

$$\text{or } \frac{1 - 8.076}{2}$$

$$= \boxed{4.538}$$

check

$$\text{or } -3.538$$

$$\textcircled{7}. 15^{(-4x+5)} - 23 = 6$$

Isolate:

$$\Rightarrow 15^{(-4x+5)} = 29$$

$$\Rightarrow \ln(15^{(-4x+5)}) = \ln(29)$$

$$\Rightarrow (-4x+5) \cdot \ln(15) = \ln(29)$$

$$\Rightarrow -4x \cdot \ln(15) + 5\ln(15) = \ln(29)$$

$$\Rightarrow -4x \ln(15) = \ln(29) - 5\ln(15)$$

$$\Rightarrow x = \frac{(\ln(29) - 5\ln(15))}{(-4\ln(15))}$$

$$= \boxed{-9.39}$$

$$\textcircled{8}. 9^{(3x-10)} = 4^{(2x-5)}$$

$$\Rightarrow \ln(9^{(3x-10)}) = \ln(4^{(2x-5)})$$

$$\Rightarrow (3x-10) \cdot \ln(9) = (2x-5) \cdot \ln(4)$$

$$\Rightarrow 3x \ln(9) - 10 \ln(9) = 2x \ln(4) - 5 \ln(4)$$

$$\Rightarrow 3x \ln(9) - 2x \ln(4) = 10 \ln(9) - 5 \ln(4)$$

$$\Rightarrow x = \frac{(10 \ln(9) - 5 \ln(4))}{(3 \ln(9) - 2 \ln(4))}$$

$$x = \boxed{3.938}$$

$$\textcircled{9}. 7e^{(x-5)} + 7 = 27$$

Isolate:

$$\Rightarrow 7e^{(x-5)} = 20$$

$$\Rightarrow e^{(x-5)} = \frac{20}{7}$$

$$\Rightarrow \ln(e^{(x-5)}) = \ln\left(\frac{20}{7}\right)$$

$$\Rightarrow x-5 = \ln\left(\frac{20}{7}\right)$$

$$\Rightarrow x = \boxed{\ln\left(\frac{20}{7}\right) + 5}$$

$$= \boxed{6.050}$$

$$\textcircled{10} \ln(-3x) - 14.3 = -11.9$$

Isolate $\xrightarrow{+14.3}$

$$\Rightarrow \ln(-3x) = 2.9$$

$$\Rightarrow e^{\ln(-3x)} = e^{2.9}$$

$$\Rightarrow -3x = e^{2.9}$$

$$\Rightarrow x = \frac{e^{2.9}}{-3}$$

$$= \boxed{-6.058}$$

$$\textcircled{11} \ln(-x-2) + \ln(x) = 2$$

$$\Rightarrow \ln((-x-2)(x)) = 2$$

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

$$\Rightarrow e^{\ln(-x^2 - 2x)} = e^2$$

$$\Rightarrow -x^2 - 2x = e^2$$

$$\Rightarrow -x^2 - 2x - e^2 = 0$$

$$\Rightarrow a = -1 \quad b = -2 \quad c = -e^2$$

$$\Rightarrow x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

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

$$= \frac{2 \pm \sqrt{1 - 4e^2}}{-2}$$

$$= 2 \pm \sqrt{-28.556}$$

NO
SOLUTION

so

NO SOLUTION