

Bellwork Tuesday 12/19

Solve the following equation (notes section, title it Example 5)

$$\ln(x-1) + \ln(x+1) = 0$$

$$\log a + \log b = \log a \cdot b$$

$$\ln(x-1)(x+1) = 0$$

$$\ln(x^2-1) = 0$$

$$\cancel{\ln(x^2-1)} = \cancel{\ln 1}$$

$$\ln 1 = 0$$

$$\ln e = 1$$

$$\ln 0 \text{ und.}$$

$$x^2 - 1 = 1$$

$$+1 \quad +1$$

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

$$x = \sqrt{2} \checkmark$$

$$x = -\sqrt{2} \times$$

$$\ln(x^2-1) = 0$$

e

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

$$1 = x^2 - 1$$

Ex 4: $\ln(x+2) + \ln(x-4) = 3\ln 2$ $a \ln b$
 $\ln(x+2)(x-4) = \ln 2^3$ $\ln b^a$
 $\ln(x^2 - 2x - 8) = \ln 8$

$$\left\{ \begin{array}{l} x^2 - 2x - 8 = 8 \\ \quad \quad \quad +8 \quad -8 \\ x^2 - 2x - 16 = 0 \\ \frac{2 \pm \sqrt{4 - 4(1)(-16)}}{2(1)} = \frac{2 \pm \sqrt{68}}{2} \end{array} \right. \begin{array}{l} \frac{2 + \sqrt{68}}{2} = 5.12 \\ \frac{2 - \sqrt{68}}{2} = -3.12 \end{array}$$

$$\frac{2 \pm \sqrt{68}}{2} \quad \begin{array}{r} 1 \\ 4 \\ 9 \\ 16 \end{array}$$

$$\frac{2 \pm \sqrt{4 \cdot 17}}{2}$$

$$= 1 \pm \sqrt{17} \quad \begin{array}{l} 1 + \sqrt{17} \approx 5 \checkmark \\ 1 - \sqrt{17} \approx -3 \times \text{excluded} \end{array}$$

p301 #37

$$\ln(x-3) + \ln(x+4) = 3\ln 2$$

$$\ln(x-3)(x+4) = \ln 8$$

$$\ln(x^2 + 4x - 3x - 12) = \ln 8$$

$$x+5=0$$

$$x-4=0$$

$$\begin{array}{l} x = -5 \\ x = 4 \end{array}$$

excluded
extraneous.

$$\ln(x^2 + x - 12) = \ln 8$$

$$x^2 + x - 20 = 0$$

$$\begin{array}{r} 5 \\ \times -4 \\ \hline 1 \end{array}$$

$$(x=4)$$

Ex 6:

$$\cancel{e^{\ln(2x)}} = \cancel{e^3}$$

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

$$\frac{e^3}{2} = \frac{2x}{2}$$

$$\boxed{\frac{e^3}{2} = x}$$

Ex 7:

$$\frac{20}{20} \left(\frac{1}{2} \right)^{x/3} = \frac{5}{20}$$

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

~~$$\left(\frac{1}{2} \right)^{x/3} = \left(\frac{1}{2} \right)^2$$~~

$$\frac{x}{3} = 2$$

$$\boxed{x = 6}$$

Homework Example:

5

$$\frac{2}{2} (10^{-x/3}) = \frac{20}{2}$$

~~$$\frac{-x/3}{10} = \frac{10}{1}$$~~

$$-x/3 = 1$$

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

Ex4 $\frac{3 \cdot 4^{x/2}}{3} = \frac{96}{3}$

$$4^{x/2} = 32$$

$$(2^2)^{x/2} = 2^5$$

~~$$(2)^x = 2^5$$~~

$$x = 5$$

Change of base Formula

$$\log_b a = \frac{\ln a}{\ln b}$$

ex: $\log_2 a = \frac{\ln a}{\ln 2}$

$$\ln \frac{a}{b} = \ln a - \ln b$$

p 289:
29-32
change of
base formula.

~~$$\frac{\sqrt{100}}{\sqrt{4}}$$~~

~~$$\frac{\sqrt{a}}{\sqrt{b}} = \sqrt{\frac{a}{b}}$$~~
~~$$\frac{\ln a}{\ln b}$$~~ incorrect