

3.5 Equation Solving

Obj: 1. Solve exponential & logarithmic fncs. algebraically.

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

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

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

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

$$x = 6$$

Nov 20-8:16 AM

$$\frac{32 \left(\frac{1}{4}\right)^{\frac{x}{4}}}{32} = \frac{2}{32}$$

$$\left(\frac{1}{4}\right)^{\frac{x}{4}} = \frac{1}{16}$$

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

$$\frac{x}{4} = 2$$

$$x = 8$$

Nov 20-9:40 AM

$$(e^x - e^{-x} = 10) e^x$$

$$(e^x)^2 - 1 = 10e^x$$

$-10e^x$ $-10e^x$

$$(e^x)^2 - 10e^x - 1 = 0$$

Let $w = e^x$

$$w^2 - 10w - 1 = 0$$

$$w = \frac{10 \pm \sqrt{100 - 4(-1)}}{2} = \frac{10 \pm \sqrt{104}}{2}$$

$$\ln e^x = \ln \frac{10 \pm \sqrt{104}}{2}$$

$$x = \ln \left(\frac{10 \pm \sqrt{104}}{2} \right) \approx 2.31$$

Nov 20-9:42 AM

$$2 \left(\frac{e^x + e^{-x}}{2} \right) = 42$$

$$(e^x + e^{-x} = 8) e^x$$

$$(e^x)^2 + 1 = 8e^x$$

$-8e^x$ $-8e^x$

$$(e^x)^2 - 8e^x + 1 = 0$$

$$w^2 - 8w + 1 = 0$$

$$w = \frac{8 \pm \sqrt{64 - 4}}{2} = \frac{8 \pm \sqrt{60}}{2}$$

$$\ln e^x = \ln \frac{8 \pm \sqrt{60}}{2}$$

$$x = \ln \left(\frac{8 \pm \sqrt{60}}{2} \right) \approx \pm 2.06$$

Nov 20-9:48 AM

$$\log_{10} x^2 = 2$$

$$10^2 = x^2$$

$$\sqrt{x^2} = \sqrt{100}$$

$$x = \pm 10$$

$$\log_b a = x$$

$$b^x = a$$

Nov 20-9:55 AM

$$\log x^2 = 6$$

$$10^6 = x^2$$

$$x^2 = 1000000$$

$$x = \pm 1000$$

Nov 20-9:59 AM

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

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

$$\ln(3x^2 - 5x + 2) = \ln x^2$$

$$3x^2 - 5x + 2 = x^2$$

Nov 20-10:02 AM

Orders of Magnitude

Distance from the Sun:
 Mercury: 5.79×10^{10} Pluto 5.79×10^{12}

Distance for Pluto is 2 ord. of mag. greater.

\$1 to a penny
 100 1
 10^2 10^0

\$1 is 2 ord. of mag. greater

Nov 20-10:04 AM

1 km to 1 m
1000
 10^3

1
 10^0

1 km is 3 orders of mag. greater

Nov 20-10:07 AM