3/21/2011
(In Class Activity)

Solve exactly:

1.) $\log x + \log(x+1) = \log 12$

2.) $\log_8(x+5) - \log_8(x-2) = 1$

3.) $x^2e^{2x} + 2xe^{2x} = 8e^{2x}$

4.) $2^{3x-5} = \left(\frac{1}{3}\right)^{x+2}$

For notes

Change of base formula:

$$\log_b x = \frac{\log x}{\log b}$$

$$= \frac{\ln x}{\ln b}$$

Answers:

1.) $x = 3$

2.) $x = 3$

3.) $x = -4, 2$

4.) $\dfrac{5\ln(2) - 2\ln(3)}{3\ln(2) + \ln(3)}$

Solutions:

1.) $\log x + \log(x+1) = \log 12$

$\log(x^2+x) = \log 12$

$x^2+x = 12$

$x^2+x-12 = 0$

$(x-3)(x+4) = 0$

$x = 3, \cancel{x=-4}$ not in domain of orig equation.

2.) $\log_8(x+5) - \log_8(x-2) = 1$

$\log_8\left(\frac{x+5}{x-2}\right) = 1$

$\frac{x+5}{x-2} = 8$

$x+5 = 8x-16$

$21 = 7x$

$\boxed{3 = x}$

3.) $x^2e^{2x} + 2xe^{2x} = 8e^{2x}$

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

$e^{2x}(x+4)(x-2) = 0$

$\cancel{e^{2x}=0}$ or $x+4=0$ or $x-2=0$

$\cancel{x=-4}$ or $x=2$

4.) $2^{3x-5} = \left(\frac{1}{3}\right)^{x+2}$

$(3x-5)\ln 2 = (x+2)\ln(1/3)$

$3x\ln 2 - 5\ln 2 = x\ln(1/3) + 2\ln(1/3)$

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

$x(3\ln 2 + \ln 3) = \quad "$

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