

Name KEY

Solve the equations and round answers to three decimal places.

✓ 1. $4^{x-5} + 21 = 30$

$$4^{x-5} = 9$$

$$\ln 4^{x-5} = \ln 9$$

$$(x-5) \ln 4 = \ln 9$$

$$x-5 = \frac{\ln 9}{\ln 4}$$

$$x = \frac{\ln 9}{\ln 4} + 5 \approx \boxed{6.585}$$

✓ 2. $\log_2 x + \log_2 5 = 6$

$$\log_2 5x = 6$$

$$5x = 2^6$$

$$5x = 64$$

$$\boxed{x = \frac{64}{5}}$$

✓ 3. $2x^2 e^{2x} - 2x e^{2x} = 0$

$$2x e^{2x} (x-1) = 0$$

$$2x = 0$$

$$x = 0$$

$$e^{2x} = 0$$

no solution

$$x-1 = 0$$

$$x = 1$$

$$\boxed{x = 0, 1}$$

✓ 4. $\ln(x+1) - \ln(x-2) = \ln x$

$$\ln \frac{x+1}{x-2} = \ln x$$

$$\frac{x+1}{x-2} = x$$

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

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

$$x = \frac{3 \pm \sqrt{9 - 4(1)(-1)}}{2}$$

$$x = \frac{3 \pm \sqrt{13}}{2}$$

negative
invalid

$$x = \frac{3 + \sqrt{13}}{2}$$