

## College Algebra Quiz 8

Name \_\_\_\_\_ Score \_\_\_\_\_ /10

**Please Print Clearly**

1. Solve the equation  $e^{3x+2} = 5$ . SHOW ALL STEPS

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

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

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

2. Solve the equation  $\ln(x) + \ln(x - 2) = 0$ . SHOW ALL STEPS

$$\ln(x) + \ln(x - 2) = 0$$

$$\ln[(x)(x - 2)] = 0$$

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

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

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

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a} = \frac{2 \pm \sqrt{(-2)^2 - 4(1)(-1)}}{2(1)} = \frac{2 \pm \sqrt{(4)(2)}}{2} = \frac{2 \pm 2\sqrt{2}}{2} = 1 \pm \sqrt{2}$$

Note that  $1 - \sqrt{2} < 0$  which is not in the domain of the  $\ln$  function.

Consequently  $1 - \sqrt{2}$  is not a solution.

Note that  $1 + \sqrt{2} > 2$  so that both  $1 + \sqrt{2}$  and  $(1 + \sqrt{2}) - 2$  are in the domain of the  $\ln$  function.

Therefore  $1 + \sqrt{2}$  is the only solution to the original equation.

3. Solve the equation  $e^{2x} - 9 = 0$ . Hint:  $e^{2x} = (e^x)^2$  SHOW ALL STEPS

$$(e^x)^2 - 9 = 0$$

$$(e^x + 3)(e^x - 3) = 0$$

$$e^x + 3 = 0 \text{ OR } e^x - 3 = 0$$

$$e^x = -3 \text{ is impossible OR } e^x = 3$$

$$x = \ln(e^x) = \ln(3)$$

$$\text{TEST: } (e^{\ln(3)})^2 - 9 = (\exp \circ \ln(3))^2 - 9 = (3)^2 - 9 = 0$$

Consequently  $\ln(3)$  is the solution