

## SIMULTANEOUS EQUATIONS – ANSWERS TO PROBLEMS:

1. Find the equilibrium solution for each of the following economic models of supply and demand

$$(a) Q_d = 24 - 2P, Q_s = -5 + 7P \quad P^* = (24+5)/(2+7) = 29/9 = 3.22 \\ Q^* = (-10+168)/(2+7) = 158/9 = 17.56$$

$$(b) Q_d = 51 - 3P, Q_s = 6P - 10 \quad P^* = (51+10)/(3+6) = 61/9 = 6.78 \\ Q^* = (-20+144)/(3+6) = 124/9 = 13.78$$

$$(c) Q_d = 30 - 2P, Q_s = -6 + 5P \quad P^* = (30+6)/(2+5) = 36/7 = 5.14 \\ Q^* = (-12+150)/(2+5) = 138/7 = 19.71$$

## LOGS AND EXPONENTS – ANSWERS TO PROBLEMS:

1. Evaluate the following:

$$(a) \log_{10} 10,000 = 4 \\ (b) \log_{10} 0.01 = -2 \\ (c) \ln e^2 = 2 \\ (d) \ln(1/e^3) = -3 \\ (e) \ln e^x - e^{\ln x} = x - x = 0$$

2. Evaluate the following by application of the rules of logarithms:

$$(a) \log_{10} (100)^{14} = 14 \log_{10} (100) = 14 \cdot 2 = 28 \\ (b) \log_{10} (100)^{-1} = -1 \cdot 2 = -2 \\ (c) \ln (3/b) = \ln 3 - \ln b \\ (d) \ln Ae^2 = \ln A + \ln e^2 = \ln A + 2 \\ (e) \ln Abe^{-4} = \ln A + \ln b + \ln e^{-4} = \ln A + \ln b - 4$$

3. Which of the following are valid?

$$(a) \ln u - 2 = \ln(u/e^2) \quad \text{VALID} \\ (b) 3 + \ln v = \ln(e^3/v) \quad \text{INVALID: } 3 - \ln v \\ (c) \ln 3 + \ln 5 = 8 \quad \text{INVALID: } \ln 3 + \ln 5 = \ln 15 \\ (d) \ln u + \ln v - \ln w = \ln(uv/w) \quad \text{VALID}$$

## ECONOMIC INTERPRETATION OF $e$ – ANSWERS TO PROBLEM:

1. What's the value of an \$100 investment five years from now if the interest rate is  $r = 0.06$  and

$$(a) \text{Interest is compounded annually?} \quad \$133.8226 \\ (b) \text{Interest is compounded monthly?} \quad \$134.8850 \\ (c) \text{Interest is compounded continuously?} \quad \$134.9859$$