2/4/2016

Doon University, Dehradun
Mid Semester, 2016
School of Social Sciences
MSc Semester – II (Economics)
Course – SSE - 152
Mathematical Methods in Economics

Time Allowed: 2hrs | Maximum Marks: 30

Section - A | Marks: 2x3 = 6

Attempt all questions

1. Evaluate $\begin{vmatrix} 4 & -5 & 8 \\ 3 & 2 & -6 \\ 8 & -6 & 5 \end{vmatrix}$

2. Find X and Y if

$$\begin{pmatrix} X+3Y & 1 \\ 0 & 2X+8Y \end{pmatrix} = \begin{pmatrix} 1 & 1 \\ 0 & 4 \end{pmatrix}$$

3. Find the rank of the matrix

$$\begin{vmatrix} 7 & -1 & 0 \\ 1 & 1 & 4 \\ 13 & -3 & -4 \end{vmatrix}$$

Section – B | Marks: 4x3 = 12

Attempt all questions

1. Prove that $\begin{vmatrix} 1 & a & a^2 \\ 1 & b & b^2 \\ 1 & c & c^2 \end{vmatrix} = (a-b)(b-c)(c-a)$

2. Consider the following national Income model:

$Y = C + I + G$
$C = a + b(Y-T)$
$T = d + tY$

Where Y = National Income, C = Consumption Expenditure, T = Tax Collection, t = Income Tax Rate.

Write down the above system of equations in the matrix form and solve for endogenous variables Y, C and T.

3. Integrate the following function w.r.t x

$X^{6/5} + X^{1/2} + 1/X^{1/2} + 1/X^{3/2}$

Section – C Marks: 6x2 = 12

Attempt **any two** questions

1. Find the solutions of the following equations by means of an inverse matrix

$X - 2Y + 3Z = 4$

$2X + Y - 3Z = 5$

$-X + Y + 2Z = 3$

2. A truck company owns three types of trucks X, Y and Z which are equipped to carry three different types of machines per load as shown below

	Type X	Type Y	Type Z
Machine I	2	3	4
Machine II	1	1	2
Machine III	3	2	1

How many trucks of each type should be used to carry exactly 29 of Type I machines, 13 of Type II machines, and 16 of type III machines?

(Assume that each truck is fully loaded

Solve the linear equations using Crammer's Rule)

3. Show that the matrix

$$X = \begin{pmatrix} 1 & 2 & 2 \\ 2 & 1 & 2 \\ 2 & 2 & 1 \end{pmatrix}$$

Satisfies the equation $X^2 - 5X - 5I = 0$

Where I is the unit matrix of order 3 and hence find X^{-1}