

School of Liberal Arts

Economics
ETE - Sep 2023

Time : 3 Hours

Marks : 50

SEM III - A080303T - Mathematical Economics
Your answer should be specific to the question asked
Draw neat labeled diagrams wherever necessary

1. Illustrate global maxima and global minima. K1 CO1 (2)
2. Suppose $g(x)$ and $h(x)$ both are the functions then Illustrate Product rule of derivative. K2 CO2 (2)
3. Differentiate the following equations K3 CO3 (2)
 $Q = 36KL - K^2 - L^2$
 $z = x^3 + 5xy^2 + y^3$
4. Given that $TR = 80q - 2q^2$, derive a function for MR. K4 CO4 (2)
5. Calculate the Determinant K4 CO5 (2)

$$A = \begin{bmatrix} 2 & 3 & 5 \\ 3 & 1 & 2 \\ 1 & 4 & 3 \end{bmatrix}$$
6. Define Saddle point. K3 CO1 (5)
7. Find (a) the minors and (b) cofactors for the elements of the third row, given K4 CO2 (5)

$$\begin{bmatrix} 9 & 11 & 4 \\ 3 & 2 & 7 \\ 6 & 10 & 4 \end{bmatrix}$$
8. Suppose the function you want to maximise is given as $\pi(q) = -1/2q^2 + 70q - 300$. Obtain the q that maximises $\pi(q)$. K6 CO6 (6)
9. (a) Find the critical points (b) Test whether the function is at a relative maximum or minimum. K4 CO3 (8)
 $z = 2y^3 - x^3 + 147x - 54y + 12$
10. Use Cramer's rule to solve given equations. K5 CO4 (8)

$$\begin{aligned} 11p_1 - p_2 - p_3 &= 31 \\ -p_1 + 6p_2 - 2p_3 &= 26 \\ -p_1 - 2p_2 + 7p_3 &= 24 \end{aligned}$$
11. Use matrix algebra to solve for the unknown variables x_1, x_2 and x_3 given that K6 CO5 (8)

$$\begin{aligned} 10x_1 + 3x_2 + 6x_3 &= 76 \\ 4x_1 + 5x_3 &= 41 \\ 5x_1 + 2x_2 + 2x_3 &= 34 \end{aligned}$$