Lecture 14 Worksheet (ECON211), AY 2025-26 [Date: 21 Aug 2025]

1. Determine whether the following function is continuous and differentiable at $x = 0$.

$$f(x) = \begin{cases} x + 1 & \text{if } x \geq 0 \\ x^2 + 1 & \text{if } x < 0 \end{cases}$$

2. Calculate first and second order derivatives for the following functions: (i) $xy = 6$, (ii) $3x^2 + 2y = 5$, (iii) $x^2 + y^2 = 4$

3. For each of the following demand functions, compute the elasticity of demand at the indicate price. Determine the type of elasticity as well (inelastic, unitary elastic, elastic). a) $q = \frac{-1}{2}p + 10$, $p = 10$; b) $q = \frac{-5}{2}p + 50$, $p = 12$; c) $2p = 144 - 2q^2$, $p = 48$.

4. Suppose that the total operating cost of running an Amazon truck for 500 km at an average speed of x km/h, is

$$150 + x + \frac{6000}{x}$$

What happens to the cost when the average speed is increased from 80 km/h to 85 km/h?