Recitation 1 - EconS 301

February 6th, 2026

1. Consider an individual with Cobb-Douglas utility function

$$u(x, y) = \sqrt{xy}.$$

Assume that her income is $I = \$120$, the price of good x is $p_x = \$4$, and the price of good y is $p_y = \$10$.

   (a) Find the marginal utility of good x, MU_x, and that of good y, MU_y.

   (b) Given your results in part (a), does this utility function satisfy monotonicity? And strict monotonicity?

   (c) Using the marginal utilities you found in part (a), find the marginal rate of substitution of this consumer (MRS).

   (d) Find the equilibrium quantities for goods x and y.

2. Consider an individual with utility function $u(x, y) = x^2y$, and facing prices $p_x = \$2$ and $p_y = \$4$.

   (a) Assuming that her income is $I = \$800$, find the optimal consumption of goods x and y that maximizes her utility. That is, solve her utility maximization problem (UMP).

   (b) Consider now that the price of good y decreases from $p_y = \$4$ to $p'_y = \$3$. Find this consumer's new optimal consumption bundle. Then, identify the total effect of the price change, and decompose it into the substitution and income effects.

   (c) Considering that the price of good y is still at $p_y = \$4$, assume now that the consumer seeks to reach the same utility level as in part (a). Find the optimal consumption of goods x and y that minimizes her expenditure. That is, solve her expenditure minimization problem (EMP).

3. Chris has demand for books (b) and other goods (y) that follows a Cobb-Douglas utility function $u(b, y) = y\sqrt{b}$, and an income of $I = \$50$. Find Chris's Compensating Variation if the price of books decreases from $p_b = \$2$ to $p'_b = \$1$.