Midterm 1

July 17, 2024

For full credit, you must show all work.

1 Problem 1

August's preferences are summarized by the utility function

$$u^A(x, y) = x^{\frac{1}{2}} y^{\frac{1}{2}}$$

September's utility function is given by

$$u^S(x, y) = \frac{1}{2}ln(x) + \frac{1}{2}ln(y)$$

Both face the following budget constraint:
$$2x + 3y = 12$$

(a) Are August and September's optimal bundles the same? Why or why not?

(b) At August's optimal bundle, how many units of good y is he willing to give up for an additional unit of good x?

(c) Do September's preferences exhibit diminishing marginal utility in good x?

2 Problem 2

November has preferences over goods x and y that are given by

$$u(x, y) = x^{\frac{1}{2}} y^{\frac{3}{4}}$$

and they face a generic budget constraint
$$p_x x + p_y y = I$$

Her demand functions are given by

(a) Derive the demand functions for good x and good y.

(b) Is x a normal good? What about y?

(c) Is good y elastic with respect to I, inelastic, or unit elastic?

(d) If the price of good x increases by 10%, how does the demand for good x change?

3 Problem 3

June's preferences are given by

$$u(x, y) = 3x + y^{\frac{1}{2}}$$

and she faces a budget constraint

$$p_x x + p_y y = I$$

Her demand functions for goods x and y are given by

$$x = \frac{I}{p_x} - \frac{p_x}{36p_y}$$

$$y = \left(\frac{p_x}{6p_y}\right)^2$$

(a) Using good y's own price elasticity of demand, determine what will happen to the quantity demanded of good y if the price of good y decreases by 15%.

(b) Show that June's price consumption curve as the price of good x changes is downward sloping.

(c) Show that June's income consumption curve is horizontal