

ECON 3104 Final Exam

Fri. May 5, 2022

1. (15 pts.) *Demand*: Find the Walrasian demand for good x and y for a consumer with a utility function $u(x, y) = y + \sqrt{x}$
2. (15 pts.) *The Edgeworth Box*: An economy consists of two people with utility functions: $u_1(x_1, y_1) = \min(x, y)$ and $u_2(x_2, y_2) = \min(x, y)$. Their initial endowments are $(x_1^i, y_1^i) = (6, 6)$ and $(x_2^i, y_2^i) = (10, 10)$. Draw the Edgeworth box for this economy, labeling the axes for each person, the initial endowment, and each person's indifference curve at this initial endowment. Is this economy in equilibrium?
3. (15 pts.) *General Equilibrium*: An economy consists of two people, both with the utility functions $u_i(x_i, y_i) = x_i^{\frac{1}{2}}y_i^{\frac{1}{2}}$. Their initial endowments are $(x_1^i, y_1^i) = (10, 10)$ and $(x_2^i, y_2^i) = (20, 0)$. Using x as the numeraire good, find the equilibrium price and the bundle each person consumes at equilibrium.
4. (15 pts.) *Duopoly Models*: Two firms operate in a market characterized by a market demand function: $Q = 40 - 2p$. They have identical cost functions $c(q_i) = \frac{1}{4}q_i^2 + 2q_i + 8$. Find each firm's **output, and price** in the:

- (a) Cournot Duopoly model
- (b) Stackelberg Duopoly model

5. (15 pts.) *Nash Equilibrium*: Find all three Nash equilibria for the following game:

		Column Player	
		L	R
Row Player	T	(10,5)	(0,0)
	B	(0,0)	(5,10)

6. (5pts.) Consider the production function: $y = \sqrt{k + \ell}$. Does this production function exhibit increasing, decreasing, or constant returns to scale? Why?
7. (5pts.) True or False: MRS is always equal to MRT at a consumer's optimal consumption bundle. If true, briefly explain why; if false, give an example.
8. (5pts.) A consumer has a Walrasian demand function for good x of: $w_x(p_x, p_y, m) = \frac{m}{p_x}$. Does their demand obey the law of demand? Is this good a normal or inferior good? Explain.
9. (5pts.) Explain why agents with concave utility functions, $\frac{\partial u(\$x)}{\partial \$x} > 0$, $\frac{\partial^2 u(\$x)}{\partial \$x^2} < 0$, for money are risk averse. Hint, you can sketch a graph to explain your answer.
10. (Bonus, 5pts.) Consider a consumer with a utility function $U(x, y) = \ln(x + y)$. Find the quantity demanded for both goods if $p_x = 5$, $p_y = 3$, and $m = 40$. Hint, this is a bit of a trick question.