

Midterm Exam

EC 311 - Intermediate Microeconomics

Winter 2024



Give every question your best shot.
Never back down. Never what?
Never Give Up.

Name: _____ 95#: _____

The maximum amount of points on this exam is 80 points. You have a total of 1h 50min (110 minutes) to complete the exam. The only items allowed on your desk at any time are a pen and/or pencil, scratch paper, a 3x5 note card, and a calculator. Everything else must be stored in your bag underneath your desk. Any form of cheating will result on a zero on the exam.

There are three sections to be completed:

- **Multiple Choice:** 10 Questions
- **Short-Answer Questions:** 4 Questions
- **Multi-Part Analysis Questions:** 2 Questions



Point totals and question specific instructions are listed for each section. Please ask for clarification if a question is not clear to you.

The exam is a total of 8 pages. **Please verify you have all 8 in your exam. If you do not, let me know immediately.**

Multiple Choice - 20 Points

Circle or "X" the answer you think most correctly answers the following questions. If you mark a choice and would like to change it, **clearly indicate which one is your correct answer**.

1. [2 points] Let x and y be desirable goods. On the (x, y) plane, moving in which direction signifies worse outcomes?

- A. Down, Left
- B. Down, Right
- C. Up, Left
- D. Up, Right

2. [2 points] For a Cobb-Douglas utility function, which of the following MRS values indicate that you would be willing to trade some x for **more** y ?

- A. -1.25
- B. 1.25
- C. 0
- D. 0.8

3. [2 points] For the utility function, $U(q, r) = \min\{3q, 2r\}$, what is the MRS?

- A. $\frac{2}{3}$
- B. $\frac{3}{2}$
- C. 6

- D. **None of the above**

4. [2 points] A Demand Curve for an arbitrary good x has a negative slope because:

- A. As P_x increases, we demand more x
- B. **As P_x increases, we demand less x**
- C. x shows diminishing MU_x
- D. The Budget Constraint slope is the negative price ratio $\left(\frac{P_x}{P_y}\right)$

5. [2 points] For an arbitrary Perfect Substitutes utility function, $U(x, y) = ax + by$, which of the following relationship between the MRS and the Price Ratio implies that you would only consume good y ?

- A. MRS = Price Ratio
- B. MRS > Price Ratio
- C. **MRS < Price Ratio**
- D. MRS = 0

6. [2 points] For an arbitrary Budget Constraint, what happens to the x-intercept when the price of Y decreases while the price of X stays the same?
- A. It moves to the right
 - B. It moves to the left
 - C. It stays the same**
 - D. Not enough information to know
7. [2 points] For the utility function $U(x, y) = 2x + 6y$ which of the following bundles places you on the same Indifference Curve as the bundle $(10, 4)$?
- A. $(22, 1)$
 - B. $(0, 8)$
 - C. $(4, 12)$
 - D. $(4, 6)$**
8. [2 points] The income elasticity of demand for an inferior good is:
- A. Negative**
 - B. Positive
 - C. Greater than 1
 - D. Between 0 and 1
9. [2 points] When the Marginal Utility of X is _____, then we say that X is a _____.
- A. Negative ; Bad**
 - B. Zero ; Good
 - C. Positive ; Bad
 - D. We cannot determine whether it is a Good or a Bad from the Marginal Utility
10. [2 points] Consider the 3 axioms of preference. In Economic Theory, why must all 3 be met by preferences when comparing bundles of goods?
- A. They make the math more easy to work through
 - B. They ensure logical consistency**
 - C. These are arbitrary rules that have no real bearing on reality
 - D. Not all axioms must be met

Short Answer - 30 Points → Made a mistake with printed points. Points are

- 11. 8 pts
- 12. 6 pts
- 13. 8 pts
- 14. 8 pts

Answer the following questions to the best of your ability. For full credit, show all of your work and clearly indicate your final solution for each party by circling the answer.

- 8 11. [8 points] My wife has the following relationships with Extra Hot Cheetos (C) and Plants (P). She absolutely loves both and needs both in her life. Plants give her happiness, but every additional plant she gets makes her anxious, meaning she wants another one but gets overwhelmed. Hot Cheetos are her favorite snack. It doesn't how much her tongue burns, she will keep eating them. She makes sure to let me know that they give her $\frac{2}{3}$ units of utility every time.

Create a utility function that properly models her feelings toward Extra Hot Cheetos and Plants. Use marginal utilities to prove that your utility function meets the above criteria.

Should look like:

$$U(C, P) = \ln(C) + \frac{2}{3}P$$

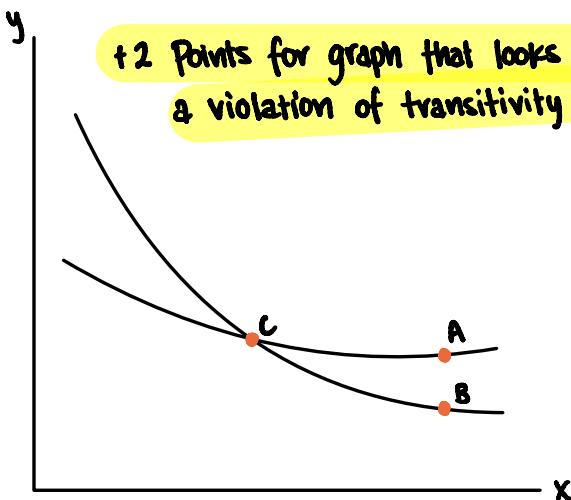
+ 4 pts for a Utility fn. that makes sense

$$MU_C = \frac{1}{C} \rightarrow \text{As ct, } MU_C + 12 \text{ pts}$$

$$MU_P = \frac{2}{3} \rightarrow \text{Always get } \frac{2}{3} \text{ units of utility for every additional unit}$$

+ 2 pts

- b 12. [6 points] Recall the non-crossing property of indifference curves. Create a graph that violates this property and explain how this graph leads to an illogical conclusion between bundles. Be sure to label everything properly.



+ 2 Points for graph that looks like & violation of transitivity

+ 4 Points for explanation of how the graph shows a violation
(Partial credit here up to your discretion)

13. [8 points] Joy and Bing Bong are stuck in the Memory Dump and are in the market for wheels for their wagon. They have the same demand for Wheels: $w^* = M - 2P_w$. Bing Bong has $M = 30$ and Joy has $M = 10$.

Find their Individual Demands and show the Market Demand for Wheels using a graph. Be sure to label everything properly.

$$w^* = M - 2P_w$$

$$\text{Joy: } x_J^* = 10 - 2P_w$$

$$\text{Bing Bong: } x_B^* = 30 - 2P_w$$

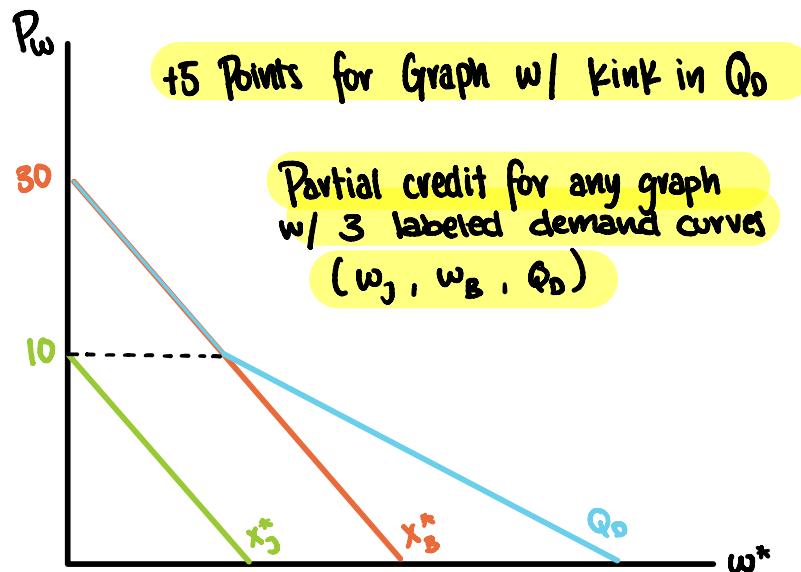
$$Q_D = w_J^* + w_B^*$$

$$Q_D = 10 - 2P_w + 30 - 2P_w$$

$$Q_D = 40 - 4P_w$$

$$\Rightarrow P_w = 10 - \frac{Q_D}{4}$$

+3 Points for correct Q_D



14. [8 points] Your demand function is given by $x^* = \frac{M^2}{P_x + 2P_y}$

What is your elasticity of demand with respect to income? What type of elasticity is this (inelastic, unit elastic or elastic)?

$$E_{x^*, m} = \frac{\partial x^*}{\partial M} \cdot \frac{M}{x^*} \quad +1 \text{ pt - Uses correct formula}$$

$$\frac{\partial x^*}{\partial M} = \frac{2M}{P_x + 2P_y} \quad +2 \text{ pts - Correct derivative}$$

$$E_{x^*, m} = \frac{\partial x^*}{\partial M} \cdot \frac{M}{x^*} = \frac{2M}{\cancel{P_x + 2P_y}} \cdot \frac{\cancel{M}}{\cancel{M^2}} = \frac{2M}{\cancel{P_x + 2P_y}} = 2 \quad +3 \text{ correct answer}$$

It is elastic +2 pts

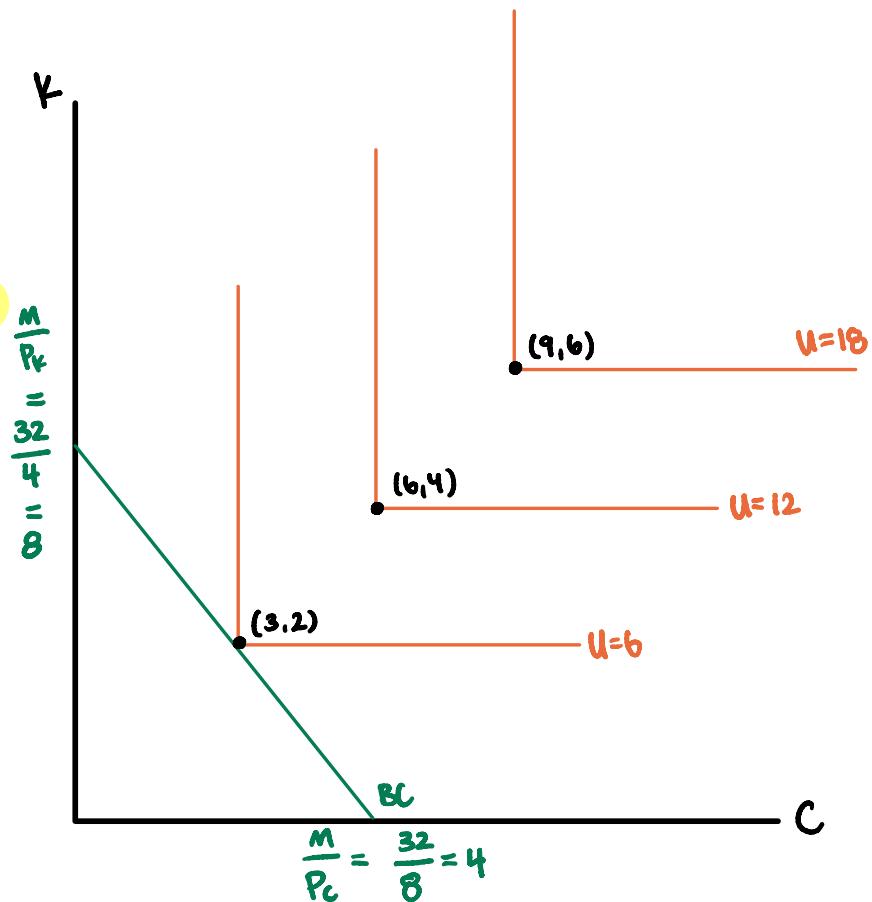
Multi-Part Analysis - 30 Points

Answer the following questions to the best of your ability. For full credit, show all of your work and clearly indicate your final solution for each party by circling the answer.

15. (15 points) My dog, Luna, has a utility function defined over Chicken (C) and Kibble (K): $U(C, K) = \min\{2C, 3K\}$. I love her very much, but I only have \$32 of income to buy her food. The price of Chicken is \$8. The price of Kibble is \$4.

- (a) [5 points] Graph the indifference curves associated with Luna's utility levels of 6, 12, 18 on the (C, K) plane. Then add a budget line corresponding to the Budget Constraint. **Be sure to label everything properly.**

- BC is $8C + 4K = 32$
- ICs are correct shape + 1 pt
- Axis labeled correctly + 1 pt
- Budget $\times \notin$ y-intercepts labeled correctly + 1 pt
- Correct IC hierarchy + 1 pt
- Min points bundles of ICs labeled + 1 pt



- (b) [3 points] For each Indifference Curve, say if it is unattainable level of utility. Explain why.

- $U=6$ is attainable because it is on BC + 1 pt
- $U=12$ \nmid $U=18$ ICs are NOT attainable because they are unaffordable + 2 pts

- (c) [2 points] Which of the 3 indifference curves, if any, correspond to a maximized level of utility? Why is this the utility maximizing bundle?

$U=6$ is the max level + 1 pt

The bundle is affordable & the IC is tangent to the BC only once

+ 1 pt

- (d) [3 points] What are the utility maximizing demands, C^* and K^* ?

$$2C = 3K$$

$$C = \frac{3}{2}K$$

Use BC: $8C + 4K = 32$

$$8\left(\frac{3}{2}K\right) + 4K = 32$$

$$12K + 4K = 32$$

$$16K = 32$$

$$K^* = 2 \quad \therefore C^* = 3$$

Correct Demands w/ work

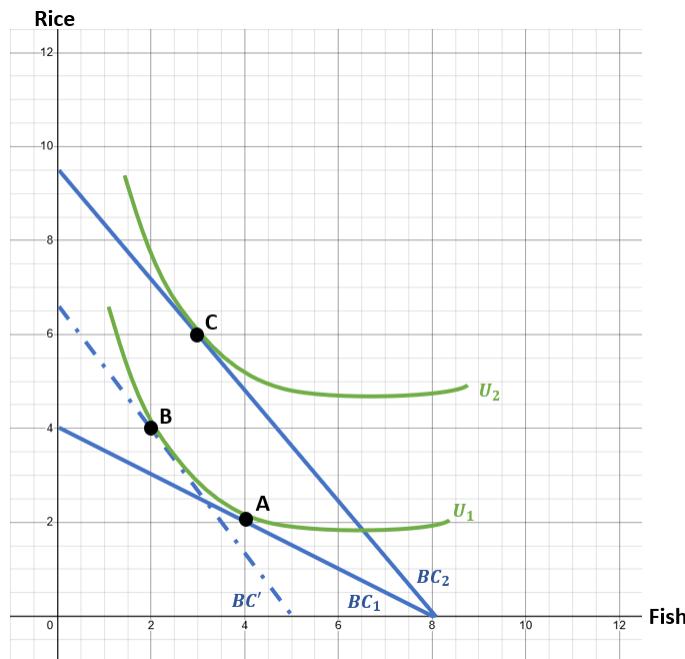
+ 3 pts

- (e) [2 points] What is the maximized level of utility at C^* and K^* ?

Plug values from (d) into Utility +1 pt

$$U(3,2) = \min \{2(3), 3(2)\} = \min \{6, 6\} = 6 \quad +1 pt$$

16. (15 points) Dante loves making sushi at home. Every Sunday he buys some sushi rice and mackerel. However, there is a price increase in sushi rice, as shown in the graph below, which moves him from optimal bundle A to optimal bundle C.



- (a) [3 points] What is the total effect of the price change on Dante's demand for Rice and for Fish?

Rice: $2 \rightarrow 6$

Dante's demand for rice increases by 4

Fish: $4 \rightarrow 3$

$\frac{1}{4}$ his demand for fish decreases by 1

+1 pt for effects

+2 pts for interpretation

- (b) [3 points] What is the substitution effect of the price change on Rice? Provide an interpretation of this effect.

Rice: $2 \rightarrow 4$

Dante substitutes Fish for Rice now that it is relatively cheaper

+1 pt for effects

+2 pts for interpretation

- (c) [3 points] What is the income effect of the price change on Rice? Provide an interpretation of this effect.

Rice: $4 \rightarrow 6$

+1 pt for effect

Dante can afford relatively more with the decrease in price of rice

+2 pts for interpretation

- (d) [3 points] Is Rice a normal or an inferior good? Explain your answer.

Rice is a normal good +1 pt

Because Dante consumes more of it as he has higher income +2 pts for explanation

- (e) [3 points] In your own words, why can we only observe the total effect when there is a relative price change? Why is the decomposition into substitution and income effect useful to our understanding of consumer behavior?

Because we can only see the final decision taken by the individual +2 pts

It is important because it lets us know more about consumer behavior

+1 pt (Something that makes sense)