Chapter 4: Consumer Behaviour

Introductory Microeconomics

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1) Budget Line and Opportunity Set

Lisa has income 50. Pizzas cost 1 each and burritos cost 2 each.

1. Write the budget constraint equation for pizzas Z and burritos B.
2. Sketch the budget line and label both intercepts.
3. Compute the slope of the budget line. Explain what the slope represents economically.

Answers: 1) Budget Line and Opportunity Set

(a) Budget constraint:

$$Z + 2B = 50.$$

(b) Intercepts: set $B = 0 \Rightarrow Z = 50$; set $Z = 0 \Rightarrow B = 25$.

(c) Solve for B: $B = \frac{50-Z}{2} = 25 - \frac{1}{2}Z$, so slope $= \dfrac{\Delta B}{\Delta Z} = -\dfrac{p_Z}{p_B} = -\frac{1}{2}$.

$\Rightarrow$ Economically, $-\frac{1}{2}$ is the market trade-off: 1 extra pizza costs giving up 0.5 burritos.

2) Affordable vs. Unaffordable Bundles

For each bundle (Z, B), determine if it is affordable. Show your calculation.

1. $(20, 9)$
2. $(15, 25)$
3. $(10, 20)$

Answers: 2) Affordable vs. Unaffordable Bundles

Cost is $Z + 2B$.

- $(20, 9)$: $20 + 2 \cdot 9 = 38 \leq 50 \Rightarrow$ affordable.
- $(15, 25)$: $15 + 2 \cdot 25 = 65 > 50 \Rightarrow$ not affordable.
- $(10, 20)$: $10 + 2 \cdot 20 = 50 \leq 50 \Rightarrow$ affordable (exactly on the line).

3) Comparative Statics: Income and Prices

1. Income rises to 60 (prices unchanged). How does the budget line shift? Does the slope change? Why?
2. Price of burritos falls to 1 (income 50, pizza price 1). What happens to:
   - The intercepts?
   - The slope?
3. On a diagram, indicate the substitution and income effects conceptually.

Answers: 3) Comparative Statics

(a) New constraint: $Z + 2B = 60$. Parallel outward shift (both intercepts increase). Slope unchanged at $-\frac{p_Z}{p_B} = -\frac{1}{2}$ since relative prices unchanged.

(b) With $p_B = 1$: $Z + B = 50$. Intercepts: $Z = 50$, $B = 50$. New slope $= -\frac{1}{1} = -1$.

(c) Substitution: toward relatively cheaper burritos. Income: real purchasing power rises; if burritos are normal, buy more due to income effect as well.

4) Preferences: Axioms

For each statement, identify the property: completeness, transitivity, or "more is better."

1. Lisa prefers bundle $A = (3, 2)$ to bundle $B = (2, 3)$.
2. Lisa prefers A to B and B to C, therefore prefers A to C.
3. Holding burritos fixed, Lisa prefers 4 pizzas to 3 pizzas.

Answers: 4) Preferences: Axioms

1. Completeness (can rank any two bundles).
2. Transitivity (consistent ordering).
3. "More is better" (monotonicity).

5) Diminishing Marginal Utility

Lisa's total utility from pizzas:

Quantity	1	2	3	4	5
Total Utility	20	38	54	66	75

1. Compute marginal utility for each additional pizza.
2. Sketch total utility and marginal utility curves.
3. Explain how the numbers show diminishing marginal utility.

Answers: 5) Diminishing Marginal Utility

(a) Marginal utility (MU):

Quantity	1	2	3	4	5
MU	20	18	16	12	9

(b) TU is increasing and concave; MU is downward sloping.
(c) MU falls as quantity rises $\Rightarrow$ law of diminishing marginal utility.

6) Equalizing MU per Dollar

Lisa consumes pizzas (P) and burritos (B). Suppose:

$$MU_P = 10, \quad p_P = 1 \qquad \text{and} \qquad MU_B = 20, \quad p_B = 2.$$

1. Compute marginal utility per dollar for each good.
2. Is Lisa maximizing utility under the rule $\dfrac{MU_P}{p_P} = \dfrac{MU_B}{p_B}$?
3. If not, how should she adjust her bundle to increase total utility?

Answers: 6) Equalizing MU per Dollar

(a) $\dfrac{MU_P}{p_P} = \dfrac{10}{1} = 10$; $\dfrac{MU_B}{p_B} = \dfrac{20}{2} = 10$.

(b) Yes, the equality holds; she is at a MU-per-dollar optimum (given these MUs).

(c) No adjustment needed (any move would lower total utility holding prices/MUs fixed).

7) Utility-Maximization Condition (Two Goods)

For goods X and Y:

$$MU_X = 20, \quad p_X = 2; \qquad MU_Y = 10, \quad p_Y = 1.$$

1. Check whether $\dfrac{MU_X}{p_X} = \dfrac{MU_Y}{p_Y}$ holds.
2. If the equality does not hold, describe the direction of adjustment for X and Y.

Answers: 7) Utility-Maximization Condition

(a) $\dfrac{MU_X}{p_X} = \dfrac{20}{2} = 10,\ \dfrac{MU_Y}{p_Y} = \dfrac{10}{1} = 10 \Rightarrow$ holds.

(b) At equality, the consumer is locally optimal; no reallocation improves total utility.

8) Income and Substitution Effects: Coffee

Coffee price falls by 10%.

1. Describe the substitution effect.
2. Describe the income effect if coffee is:
   - A normal good.
   - An inferior good.
3. Which effect typically dominates for most goods? Explain briefly.

Answers: 8) Income and Substitution Effects

(a) Substitution: coffee is relatively cheaper $\Rightarrow$ substitute toward coffee and away from other goods.

(b) Income effect: real purchasing power rises.
Normal coffee $\Rightarrow$ buy more.
Inferior coffee $\Rightarrow$ buy less (income effect opposes substitution).

(c) Typically the substitution effect is the primary driver; for normal goods both effects raise quantity demanded after a price fall.

9) Normal, Inferior, and Giffen Goods

1. Give an example of a normal good where both effects increase quantity demanded after a price fall.
2. Give an example of an inferior good where the income effect partially offsets the substitution effect.
3. Define a Giffen good and explain how an upward-sloping demand curve can arise.

Answers: 9) Normal, Inferior, and Giffen Goods

1. Normal: e.g., fresh produce, branded coffee. Price falls $\Rightarrow$ substitution + income effects $\uparrow Q$.
2. Inferior: e.g., instant noodles, store-brand staples. Price falls $\Rightarrow$ substitution $\uparrow$ but income effect $\downarrow$ (net still usually $\uparrow$).
3. Giffen: an inferior staple where the negative income effect outweighs substitution, so when price rises, quantity demanded rises (positively sloped demand).

10) Consumer Surplus: Milk

Willingness to pay (per glass) and market price $p = 0.30$:

Glass	1	2	3	4	5	6
WTP	3.00	1.50	1.00	0.80	0.60	0.50

1. How many glasses will the consumer buy?
2. Compute total consumer surplus.
3. Illustrate consumer surplus on a price–quantity diagram.

Answers: 10) Consumer Surplus: Milk

(a) Buy all glasses with WTP $\geq p$. Here all 6 satisfy WTP $\geq 0.30 \Rightarrow$ buy 6.

(b) Total CS:

$$\sum_{i=1}^{6}(\text{WTP}_i - p) = (3.00-0.30)+(1.50-0.30)+(1.00-0.30)+(0.80-0.30)+(0.60-0.30)+(0.50-0.$$

(c) Shade area between the individual demand steps (WTP schedule) and the horizontal line at $p = 0.30$ for the first 6 units.

11) Paradox of Value

Explain why water (essential) is cheap while diamonds (non-essential) are expensive using:

- Total utility vs. marginal utility.
- The role of supply in determining market price.
- The purchase decision at the margin.

Answers: 11) Paradox of Value

- Water has high *total* utility but, due to plentiful supply, a low *marginal* value at the purchased quantity; price reflects marginal value.
- Diamonds are scarce, so marginal value is high at the purchased quantity; price is high even if total utility is lower.
- Consumers buy until marginal value equals price; prices depend on both demand and supply at the margin.

12) Luxury and Veblen Goods

1. Define a *luxury good* and give one real-world example.
2. Define a *Veblen good* and give one real-world example.
3. Explain why a Veblen good can have an upward-sloping demand curve (status signaling).

Answers: 12) Luxury and Veblen Goods

1. Luxury: income elasticity > 1. Example: high-end travel, designer clothing.
2. Veblen: demand rises with price because price signals status. Example: certain luxury handbags or watches.
3. Higher price $\Rightarrow$ stronger status signal $\Rightarrow$ some consumers demand more, yielding an upward-sloping segment.