

Write your answers in the space provided.

1. Fill in the blanks:

- (a) (4 points) An inferior good is one for which demand **decreases** when **income** increases.
- (b) (4 points) A rational preference relation is one that is **complete** and **transitive**.
- (c) (4 points) A consumer's **marginal rate of substitution** measures the amount of one good they are willing to give up to get more of another.
- (d) (4 points) If a consumer prefers the bundle (3,3) to (4,4), their preferences **are not monotonic**.

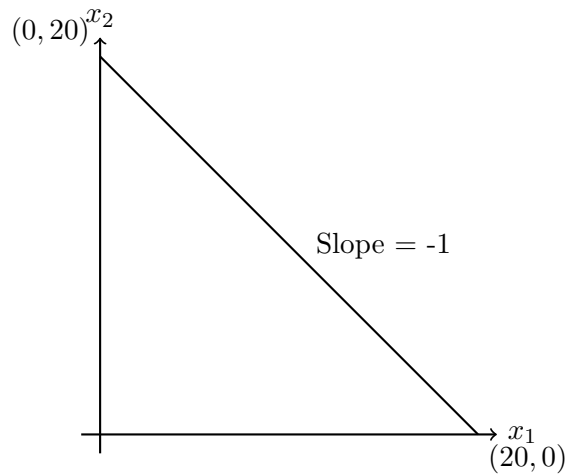
2. Consider the following rational preference relation on the set $\{a, b, c\}$:

$$a \succsim a, \quad b \succsim b, \quad c \succsim c, \quad b \succsim a, \quad b \succsim c, \quad c \succsim a, \quad c \succsim b.$$

- (a) (4 points) Is this preference relation complete?
Yes.
- (b) (4 points) Write the strict preference relation $\succ$.
 $b \succ a, c \succ a$
- (c) (4 points) Write the indifference relation $\sim$.
 $a \sim a, b \sim b, c \sim c, b \sim c$
- (d) (4 points) Write the preferences in chain notation.
 $b \sim c \succ a$
- (e) (4 points) What is **best** from the set $\{a, b\}$?
 b

3. A consumer has utility function $U(x_1, x_2) = 3x_1 + 2x_2$. Income is $m = 20$. Initially, prices are $p_1 = 1, p_2 = 1$.

(a) (4 points) Sketch the consumer's budget line, label the **end-points** and the **slope**.



- (b) (4 points) What is the consumer's **Marginal Rate of Substitution**?
 $-\frac{3}{2}$

- (c) (4 points) What bundle (x_1, x_2) does the consumer demand?
 $(20, 0)$

- (d) (4 points) Suppose the price p_1 changes to $p_1 = 2$. Now what bundle (x_1, x_2) does the consumer demand?
 $(0, 20)$

- (e) (4 points) Of the change in demand due to this price change, how much is due to the substitution effect?
 20

- (f) (4 points) Of the change in demand due to this price change, how much is due to the income effect?
 0

4. A consumer has utility for consumption in period 1 c_1 and consumption in period 2 given by $U(c_1, c_2) = \min\{c_1, c_2\}$. Their income in period 1 is $m_1 = 1000$ and their income in period 2 is $m_2 = 2000$. The interest rate is $r = 0.5$.

(a) (4 points) Write the consumer's budget equation.

$$1.5c_1 + c_2 = 3500$$

(b) (4 points) How much consumption can they have in period 2 if they only consume in period 2?

$$3500$$

(c) (4 points) What is this consumer's optimal choice of (c_1, c_2) ?

$$c_1 = 1400, c_2 = 1400$$

(d) (4 points) Is the consumer a borrower / saver / neither?

Borrower

(e) (4 points) If the interest rate decreased to $r = 0.25$ is the consumer a borrower / saver / neither?

Borrower

5. Suppose someone's utility function is $U(x_1, x_2) = x_1x_2$.

(a) (4 points) What is their Marginal rate of substitution?

$$-\frac{x_2}{x_1}$$

(b) (4 points) Write down an equation that implies that the slope of the budget equation is the same as their indifference curve at the point (x_1, x_2) . (Hint: This is the "*Tangency*" condition.)

$$-\frac{x_2}{x_1} = -\frac{p_1}{p_2}$$

(c) (4 points) For this consumer, $(2, 4) \sim (4, 2)$. What is another bundle that is indifferent to $(2, 4)$ and $(4, 2)$?

$(8, 1)$ or $(1, 8)$ or $(\sqrt{8}, \sqrt{8})$ among others.

(d) (4 points) What is the convex combination of the bundles $(4, 2)$ and $(2, 4)$ if the weight on the bundle $(4, 2)$ is $t = \frac{1}{2}$?

$$(3, 3)$$

(e) (4 points) How does the bundle you found in part d compare to $(2, 4)$ and $(4, 2)$? Does this violate **convexity** or not?

$(3, 3) \succ (2, 4)$ and $(3, 3) \succ (4, 2)$. This **does not** violate convexity.