

1. (21 Points) Briefly describe the following in a way that a person who **has not studied economics or mathematics would understand**:

A. (7 points) What is a **Utility Function**?

A mathematical representation of a person's preferences (or similar).

B. (7 points) What is a **Giffen Good**?

A good for which demand increases when price increases (or similar)

C. (7 points) What is the **Marginal Rate of Substitution** between two goods?

A number that measures how much of one good a person is willing to give up to get some of the other good.

2. (42 Points) Greg Benedict has a strange diet. He eats crepes (x_1) and oranges (x_2). His preferences are described by the utility function $U(x_1, x_2) = \ln(x_1) + \frac{1}{10}x_2$. The price of crepes is \$2 and the price of oranges is \$1. He has \$15 to spend.

A) What is his **Marginal Rate of Substitution**?

$$\frac{10}{x_1}$$

B) How many **Oranges** does he buy at these prices?

$$-\frac{10}{x_1} = -\frac{2}{1} \text{ and thus } x_1^* = 5$$

C) If the price of Crepes goes up to \$5, what is his *new demand* for **Crepes**?

$$-\frac{10}{x_1} = -\frac{5}{1} \text{ and thus } x_1^* = 2$$

D) What income would he need to afford the bundle of Crepes and Oranges he was buying *before the price change*?

$x_2^* = 5$ before the price change. Thus, he needs $5 * 5 + 5 * 1 = 30$ to afford this bundle.

E) What part of his change in demand for crepes is due to the **Income Effect**?

If he had 30, he would still buy $x_1^* = 2$ at the new prices. Thus, the change is **all** due to substitution. The income effect is **zero**.

F) Suppose we did not know how much Greg had to spend, but observed that he *only ate Crepes*. What can we infer about his income?

Let's just assume that $p_1 = 2$. Greg wants $x_1^* = 5$ crepes. However, this will cost 10. He will spend the remainder of his money on oranges. So, if we observe that he does not buy any oranges his income must not be enough to afford the 5 crepes he wants. We can infer his income is less than or equal to 10. As a note, in this case the answer would be the same if we assumed $p_1 = 5$ since he would also spend a total of 10 to buy the 2 crepes he demands at that price.

3. (35 Points) Kanye consumes Cups of Fancy Coffee¹ (x_1) and Chipotle Burrito Bowls² (x_2). His demand for these things are $x_1 = \frac{1}{2} \frac{m}{p_1}$ and $x_2 = \frac{1}{2} \frac{m}{p_2}$.

¹While I have no proof of this, a poster on one fan forum claims that he "probably" drinks coffee.

²This one is confirmed.

A. Is **Coffee** a *Normal* or *Inferior* good for Kanye?

Normal, his demand increases in income.

B. Are Coffee and Chipotle *Substitutes*, *Compliments*, or *Neither*?

Neither. His demand for chioptle doesn't depend on the price of coffee and his demand for coffee doesn't depend on the price of chipotle.

C. Sketch Kanye's **Eagle Curve** for **Chipotle**.

It is the curve $m = 2p_1x_1$. Thus it is a line through the origin with a slope of $2p_1$.

Suppose Kim is not happy unless she consumes Chipotle and Coffee together. Specifically, her utility function is $U(x_1, x_2) = \min\{x_1, x_2\}$.

D. Briefly describe, *in plain English* how Kim's demand for Coffee and Chipotle differs from Kanye's.

Kim *always* consumes one cup of coffee with every burrito bowl she eats. She consumes at a 1 to 1 ratio regardless of the prices. The ratio Kanye consumes at depends on the prices.

E. Suppose Kanye and Kim each have the same amount of money to spend. Suppose you do not know the price of Coffee, but you know Chipotle cost $p_2 = 5$. You observe that Kim and Kanye both consume the same amount of Coffee. *What must the price of Coffee be?*

It must be the same at the price of chipotle. This is because to get Kanye to consume at a one to one ratio, the price of chipotle and the price of coffee must be the same. To see this: $x_1 = x_2$ for Kanye when: $\frac{1}{2} \frac{m}{p_1} = \frac{1}{2} \frac{m}{p_2}$ simplifying this gives $p_1 = p_2$.

4. (2 Points) Briefly, *write anything*.