EC 204 Homework 2: Intro to Consumer Theory

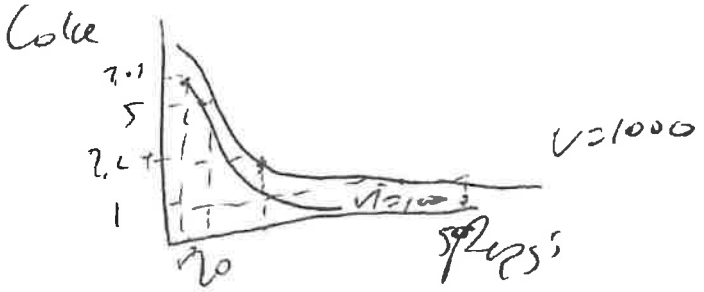
Due 10/03

1.) Suppose that your utility from the consumption of Coke and Pepsi can be expressed as:

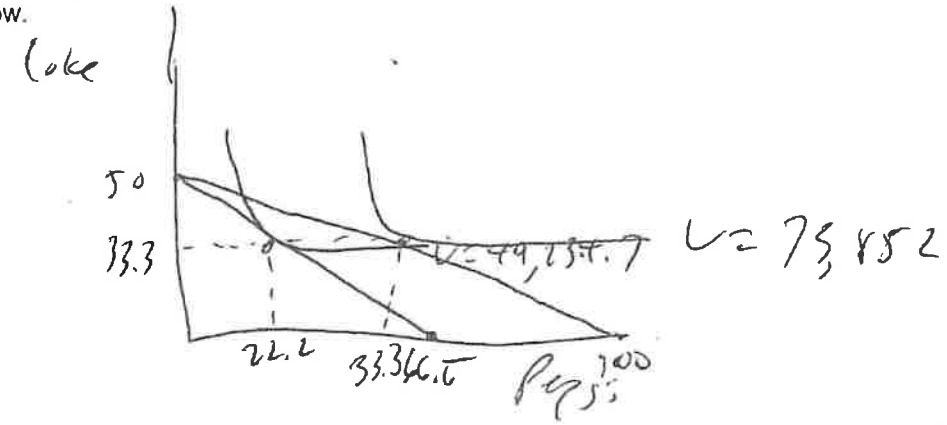
$$U(C,P) = 2C^2P$$

Where F is the number of units of food consumed and C is the number of units of clothing consumed.

a. Draw indifference curves for **U = 100** and **U = 1000**.



b. If you have **$100** to spend on these two goods, and **C units cost $2** each and **P units cost $1.5** each, draw your budget constraint below.



c. Calculate the **utility maximizing** quantities of Coke and Pepsi for you under these circumstances. Show this solution in your diagram above. What is the marginal utility of food at this point? The marginal utility of clothing? The consumer's total utility?

$MU_C = 4CP$

$MU_P = 2C^2$

$\frac{4CP}{2C^2} = \frac{2}{1.5}$

$6CP = 4C^2$

$6P = 4C$

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

$2C + 1.5P = 100$

$2(\frac{3}{2}P) + 1.5P = 100$

$3P + 1.5P = 100$

$4.5P = 100$

$P = 22.\overline{2}$

$C = 33.\overline{3}$

$MU_C = 4(33.3)(22.2) = 2957.04$

$MU_P = 2(33.3)^2 = 2217.78$

Total Utility $= 2(33.3)^2(22.2) =$ 49134

d. Suppose a price war drives the price of Pepsi down to $1. Calculate the impact of this event on the utility maximizing quantities of Coke and Pepsi for you. Show this new solution in your diagram. What happens to your total utility? Why?

$\frac{4CP}{2C^2} = \frac{2}{1}$ $4C^2 = 4CP$

$C = P$

$2C + P = 100$

$3C = 100$

$C = 33.\overline{3}$ $P = 33.\overline{3}$ Total Utility $= 2(33.\overline{3})^2(33.\overline{3})$

$= 73,852.1$

Utility increases as spending power increases.

e. Suppose that the federal government decides to take away from your income enough to return you to your old ***utility*** level. How much money would they have to take away? Explain your answer carefully and think about the impact of the price change on your choices.

$49234.7 = 2C^2P$ $2(29.1) + 29.1 = 87.28$

$C = P$ $100 - 87.28 = \$12.72$

$49234.7 = 2C^3$

$C^3 = 29.1$ $P = 29.1$

The price change made the consumer richer, the govt must take away $12.72 in income to compensate

2.) Suppose that a typical poor family spends $5040 on either heating (H) or Soup (S). Moreover, suppose that this family's utility function is given by

$$U(H,S) = 30H^2S^2$$

and that the **price of heating oil is $10 per unit** while the **price of soup is $1 per unit.**

a. If the typical poor family is maximizing their utility, how much of its income of **$5040** will be spent on heating oil?

Heating oil

Expense: $252.10 = \$2,520$

$\frac{60HS^2}{60H^2S} = \frac{10}{1} \Rightarrow \frac{S}{H} = \frac{10}{1}$ $10H = S$

$10H + S = 5040$ $20H = 5040$ $S = 2520$

$H = 252$

b. The government decides to lift this poor family's level of utility or satisfaction by subsidizing the family's consumption (i.e., paying part of the price) of soup. By allowing this family to purchase soup at half the market price (with the other half of the market price paid by the government), how many more units of soup will be purchased?

$\frac{S}{H} = \frac{10}{5}$ $S = 2H$

$10H + 10H = 5040$ 5040

$H = 252$ $S =$

Total Util =

$= 4.84e13$

c. What would be the cost of this program to the government per typical poor family?

$(.5)(5040) = [illegible]$

$\$2,520$

d. The government could also achieve its objective of lifting this poor family's level of satisfaction to the same level as that provided by the soup subsidy program by giving instead a cash subsidy. How large must this cash subsidy be? (*HINT: The answer to this part will be less than your answer to part c. Why?)*

$4.84e^{13} = 30H^3S^2$

$\Rightarrow 1.6e^{12} = H^2(10H)^2$

$\Rightarrow = 400H^4$

$H = [illegible]\ 356.4$

$S = 3564$

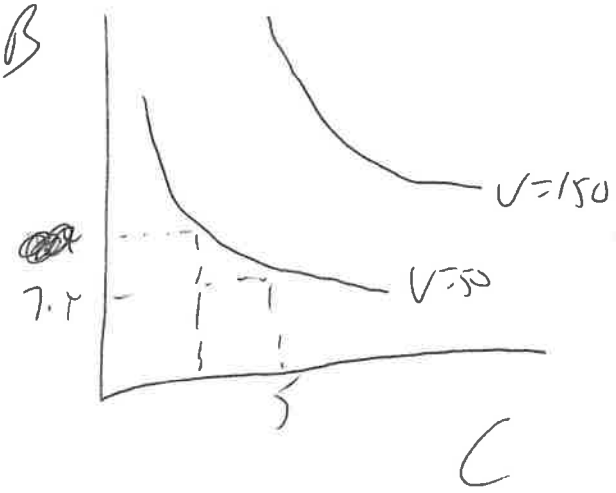
$356.4(10) + 3564 = 7127.63$

$7127.63 - 5040 = \$2,087.63$

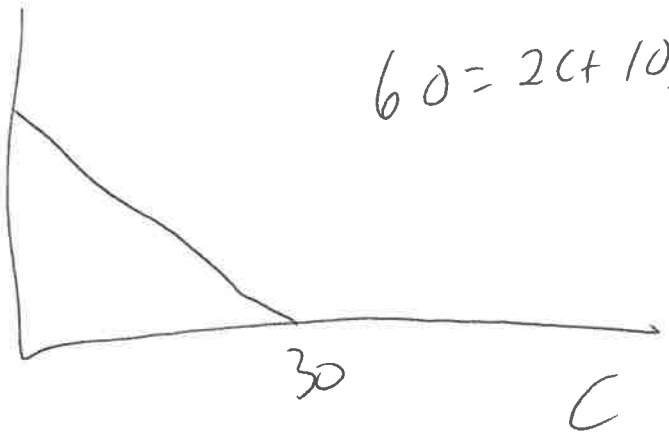
subsidy

3.)

a.)



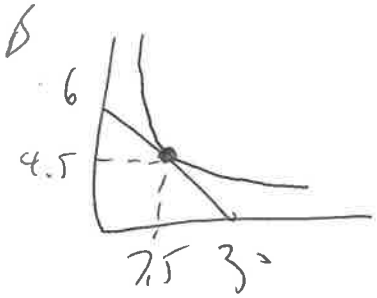
b.)



$60 = 2C + 10B$

c.) $MU_B = \frac{4.5B^{.5}C^{-.5}}{1.5B^{1.5}C^{.5}} = \frac{10}{2}$

$MU_C = 1.5B^{1.5}C^{.5}$



$\frac{3C}{3B} = \frac{5}{1}$ $\quad C = \frac{5}{3}B$

$60 = 2(\frac{5}{3}B) + 10B$

$B = 4.5$

$C = 7.5$

$MU_B = 8.71$

$MU_C = 5.23$

$U = 78.43$

6.) $\frac{3C}{B} = \frac{8}{2}$

$60 = 8B + 2C$

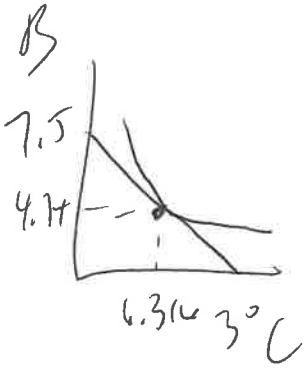
$3C = 4B$

$C = \frac{4}{3}B$

$B = 5.625$

$C = 7.5$

$U = 109.6$



8.) skip