Economics 11 Caltech Spring 2010

QUIZ 2

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Following the Honor code, you should find 20 minutes and do the quiz, by yourself and without using any notes. Paper and pen should be all you need. Turn it in by Thursday 4-15 5pm. (drop off in lecture or in box in front of Baxter 133).
Each quiz is worth 6pts (for 48 out of 200 possible pts for all 8 quizzes)

The answers to the whole homework will be available Friday at 2pm.
**Definition**
3 lines or less

1pt Please explain Marginal rate of substitution.

Reflects the tradeoff, from the consumer’s perspective, between the goods; How much of one good is the consumer willing to give up for a unit of another.

**Word problem**

2pts True or False: Please explain each question in a few sentences.

If pork chops and mashed potatoes are the only goods consumed and they are perfect complements, then neither can be an inferior good.

False. When the income of a consumer increases, then he can increase the consumption either of pork shops or mashed potatoes. Since both goods are complement of each other, then an increase in income must increase the demand of both goods.
1. Anna spends all of her income on shirts and jeans \( J \). Anna’s preferences can be represented by the utility function \( U(S,J) = S^{0.4}J^{0.6} \).

- Derive the demand functions for shirts and jeans in terms of the price of shirts \( P_S \) the price of jeans \( P_J \), and income \( I \).
- Suppose the price of a shirt is $4, the price of a pair of jeans is $12, and Anna has $200 income. What bundle of shirts and jeans \( (S,J) \) maximizes Anna’s utility?
- Suppose we double both prices What happens to Anna’ utility?

Sol: We have to solve the following program

Max \( U \) Sbjt to \( I \geq P_J J + P_S S \)

The Lagrangian for this problem is:

\[
max L(S,J,\lambda) = U(S,J) - \lambda(I - P_J J - P_S S)
\]

FOC conditions

\[
\begin{align*}
\frac{\partial L}{\partial S} &= 0.4S^{-0.6}J^{0.6} - \lambda P_S = 0 \\
\frac{\partial L}{\partial J} &= 0.6S^{0.4}J^{-0.4} - \lambda P_J = 0 \\
\frac{\partial L}{\partial \lambda} &= I - P_J J - P_S S = 0
\end{align*}
\]

Solving we find \( S^* = 0.4I/P_S \) and \( J^* = 0.5I/P_J \)

\[
\begin{align*}
S(4,12,200) &= 0.4*200/4 = 20 & J(4,12,200) &= 0.6*200/12 = 10 \\
S(8,24,200) &= 0.4*200/8 = 10 & J(8,24,200) &= 0.6*200/24 = 5 \\
U(20,10) &= 20^{0.4}10^{0.6} = 2(10^{0.4}5^{0.6}) = 2U(10,5) \text{ her utility falls by half.}
\end{align*}
\]