

1. Marshallian demand functions must satisfy the following properties:

- (a) $x_i(p, m) \geq 0, i = 1, \dots, k.$
- (b) $x_i(tp, tm) = x_i(p, m), \forall t \geq 0, i = 1, \dots, k.$
- (c) $\sum_{i=1}^k p_i x_i(p, m) \equiv m.$
- (d) The matrix of substitution terms

$$\left[\frac{\partial h_j(p, u)}{\partial p_i} \right]_{k \times k} = \left[\frac{\partial x_j(p, m)}{\partial p_i} + \frac{\partial x_j(p, m)}{\partial m} x_i(p, m) \right]_{k \times k}$$

is symmetric and negative semidefinite.

Show that the Cobb-Douglas demand functions, derived from (??) and given by

$$\begin{aligned} x_1(p, m) &= \frac{am}{p_1} \\ x_2(p, m) &= \frac{(1-a)m}{p_2} \end{aligned}$$

satisfies the above properties.

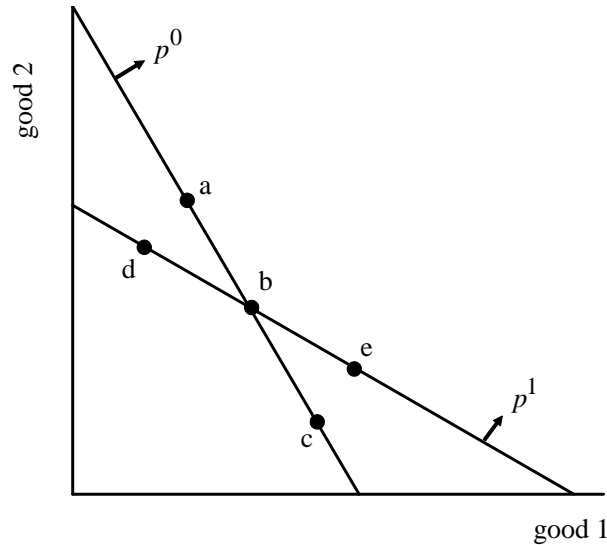
- 2. The so-called “Law of Demand” says that the demand for a good varies inversely with the price of the good, *ceteris paribus*. What is the relationship between the “Law of Demand” and the Slutsky equation?
- 3. A first-year student once complained: “Why do we spend any time studying Hicksian (compensated) demand functions? Hicksian demand functions depend on utility, which is unobservable, and thus they are also unobservable.” In fact, Hicksian, or compensated, demand functions serve many useful purposes in the analysis of demand. For example, compensated demand functions can be used to demonstrate the empirical implications of utility maximization. Write a short essay that explicates this idea. (Hint: Begin the essay with a statement of the Slutsky equation.)
- 4. The world according to the GARP.
 - (a) State the Generalized Axiom of Revealed Preference (GARP) using *only* mathematical inequalities.
 - (b) When there are only two observations of consumer behavior the GARP can be stated in a simpler form. State the GARP in this case using *only* mathematical inequalities.

- (c) Give an example of two observations of consumer behavior for which the GARP is violated. Be sure to demonstrate the validity of your example. (Don't use one of the examples below even if it applies to this question. Make up your own example.)
5. Here are two observations of a consumer's behavior.

	p_1	p_2	x_1	x_2
Obs 1	1	2	2	5
Obs 2	2	2	3	4

Is this consumer maximizing a locally nonsatiated utility function?

6. Consider the following diagram.



The chosen bundle on the p^0 budget line, denoted x^0 , can occur at point a, point b, or point c. Similarly, the chosen bundle on the p^1 budget line, denoted x^1 , can occur at point d, point b, or point e. Thus, there are nine different combinations of choices. For each combination, check to see whether the Weak Axiom of Revealed Preference is satisfied or violated.

7. You observe a consumer making the following choices at the following prices in two different periods.

	p_1	p_2	x_1	x_2	m
Period 1	2	1	3	3	9
Period 2	1	2	2	4	10

Is this consumer maximizing utility? Justify your answer.

8. You observe a consumer making the following choices at the following prices in three different periods

	p_1	p_2	p_3	x_1	x_2	x_3
Obs 1	1	2	3	6	5	4
Obs 2	3	1	2	4	6	5
Obs 3	2	3	1	5	4	6

Is this consumer maximizing utility? Justify your answer.