

## Sample Midterm

Note: in Q2 the Marshallian is the usual demand curve and the Hicksian refers to the substitution effect only.

1. **Utility maximization I** (25 points) Laura makes \$200 a week at her summer job and spends her entire weekly income on running shoes and designer jeans, since these are the only two items that provide utility to her. Furthermore, Laura insists that for every pair of jeans she buys, she must also buy a pair of shoes (without the shoes, the new jeans are worthless).
  - (a) Draw two of Laura's indifference curves, putting Jeans on the horizontal axis and Shoes on the vertical axis.
  - (b) If jeans cost \$20 and shoes cost \$20, how many will Laura buy of each? Draw in the graph the optimal point.
  - (c) Suppose that the price of jeans rises to \$30 a pair. How many shoes and jeans will she buy?
  - (d) To what effect (income or substitution) do you attribute the change in your choices between part (b) and (c)?
2. **Income and substitution effects I** (25 points) Luisa's utility depends on the number of apples ( $A$ ) and pears ( $P$ ) she consumes. On a graph, illustrate income and substitution effects using (well behaved) indifference curves and then graphically derive the Hicksian and Marshallian demand curve for  $A$  when  $p_A$  rises and we assume that
  - (a)  $A$  is a normal good.
  - (b)  $A$  is a regular inferior good.
  - (c)  $A$  is Giffen good.
3. **Utility Maximization II** (25 points)
  - (a) You have an income of \$24 and the only two goods you consume are apples and pears, which are perfect substitutes for you (and you are willing to trade them one for one). Originally, the price of apples is \$4, and the price of pears is \$3. Draw a budget line (carefully labelling the intercepts) and indifference curves and show your optimal consumption point. How many apples and pears do you consume?

- (b) The government decides to pay you \$2 for each of the first four pears you consume, and then charge you \$2 per pear (in addition to the price) for any amount in excess of 4 pears you consume. How does your budget line change? How many apples and pears do you now consume? (Hint: the budget line is no longer going to be a straight line, the government intervention is changing the prices faced by the consumer)
4. **Social security and inflation** (25 points) The federal government uses the following compensation scheme to adjust social security checks for the elderly if there is inflation: It determines the average bundle of goods consumed by an elderly household, and, whenever prices increase, social security checks are adjusted by an amount that ensures that the average elderly household will still be able to afford the original bundle. In this problem, imagine that the elderly are identical and that they care only about good  $x$  and  $y$ .
- (a) Graph the original budget constraint for an elderly household for some initial prices. Carefully draw a few well behaved indifference curves and indicate the household's optimal point by  $(x^*, y^*)$ . Suppose now that the price of  $x$  increases and the government uses its scheme to compensate the elderly. Draw the new budget constraint. Will the elderly choose the same basket  $(x^*, y^*)$ ? If not, will they end up consuming now more or less  $x$ ? Why? (Hint: remember the sign of the substitution effect)
- (b) The stated goal of the government's compensation scheme is "to ensure that the elderly become *neither worse nor better off* as a result of price increases." For what kinds of preferences does the government scheme always achieve this purpose? Explain in terms of substitution effects.
- (c) *True or False*: Assuming that the elderly have well behaved preferences (i.e. smooth, convex indifference curves with no kinks), the government's compensation scheme achieves its purpose of keeping the elderly as well off as they were originally only if all prices always change by the same proportion (explain).