

**Exam 1 Version 1.1**

**You have 85 minutes to complete this 100-point closed-book, closed-notes, closed-crib sheet, closed-programmable calculator exam. Write clearly and coherently; label your graphs completely. Answers may not be whole numbers. You MUST show your calculations on problems that require them, in order to receive any credit for those problems. Good luck!**

1. A market for good X has 500 identical buyers with incomes of \$1000 each and utility functions  $U = X^{.6}Y^{.4}$

The price of Y is currently \$10 and the price of X is currently \$5

- a) (8 points) Calculate each individual's utility-maximizing consumption of X and Y.
- b) (8 points) What is the equation representing the individual's demand for X? (Assume \$1000 income and Y at \$10)

Now the price of X doubles (while income and price of Y remain constant)

- c) (10 points) Illustrate the change in an individual's demand for X and Y, using two indifference curves and two budget constraints. Note:
- precisely plot two points, and identify their numerical coordinates: one point, A, should represent the individual's consumption before the price hike in X. The other point, B, should represent the individual's consumption after the price hike in X.
  - carefully label the income and substitution effects of the price change on your graph.

- d) (8 points) Precisely plot the **market** demand curve for X. Carefully label at least 3 points on the curve, including their numerical coordinates.

2. A market is described by demand curve  $Q_d = 1400 - 1.5P$  and supply curve  $Q_s = -100 + .5P$

a) (8 points) Calculate the equilibrium price and quantity.

Now a price ceiling is imposed of \$500

b) (8 points) Does this ceiling cause a surplus, or does it cause a shortage? Calculate the surplus or shortage. (Indicate whether it is a *surplus* or a *shortage*.)

c) (8 points) Calculate the loss of efficiency (deadweight loss) resulting from the price ceiling.

3. A firm has demand curve  $Q_d = 1000 - 5P$  for its product.
- a) (8 points) Calculate the price elasticity of demand for this firm's product between \$10 and \$20.
4. Both Zippy and Buffy like beer and wine. But Zippy likes beer a lot, while Buffy likes wine a lot.
- a) (8 points) Draw a set of (two) indifference curves for Buffy and a set of (two) indifference curves for Zippy. Take care with the slopes of the curves.
- b) (8 points) If both Zippy and Buffy pay the same prices for beer and wine, will their marginal rates of substitution of beer for wine be *the same* or *different*? Carefully explain.

5. Suppose the income elasticity of demand for food is .5, and the price elasticity of demand is  $-1$ . Suppose also that in 1999 Goofy spends \$20,000 per year on food, that the price of food is \$4, and that his earned income is \$50,000.

In the year 2000 a \$4 sales tax on food now causes the price of food to double. (Earned income, price elasticity, and income elasticity remain constant.)

- a) (10 points) Calculate the *change* in Goofy's food consumption.

6. Hal Tu Thowsind, fake economist, observes (with complete accuracy) that in the past year gasoline unit sales have remained precisely constant, despite a \$.30 increase in gasoline prices. Based on this data, he claims "Demand for gasoline is completely price inelastic!"

- a) (8 points) Refute Hal's claim. Discuss at least one other factor that can affect gasoline demand, and draw a graph illustrating your refutation. (Note: do not dispute Hal's data on gasoline sales; assume that they are accurate.)