

Test #1

Points for each problem are shown out of 100 points. Each subsection in a problem is weighted equally. Try to allocate your time accordingly.

A. (20 pts) Answer True, False, or Uncertain, and briefly explain your answer.

- (1) If leisure is an inferior good, the labor supply curve is backward-bending.
- (2) Asset diversification increases utility.
- (3) Engel curves are upward-sloping.
- (4) If a person is a borrower and the interest rate decreases, he will remain a borrower.

B. (20 pts) Short answers.

- (1) Given a demand curve $Q_D = 50 - 5P$, when the price changes from 5 to 2, what is the associated change in consumer surplus?
- (2) Oksana has the utility function $U = \sqrt{X} + 2Y$. What is her marginal rate of substitution between X and Y?
- (3) Give an example of two goods for which you have concave preferences and draw two representative indifference curves, labelling them to show which one corresponds to a higher level of utility.
- (4) Draw the budget constraint for a person who has first period income of \$400 and second period income of \$840, facing an interest rate of 5%. Be sure and label the endowment point and the intercepts on both axes.

For the following problems, please show the calculations used to arrive at your answers. Draw graphs neatly and label axes and points clearly. Round answers to the first decimal place if necessary.

C. (15 pts) Vikram is offered the choice of receiving his income of \$90,000 or participating in a gamble that pays \$100 with a probability of 75% and \$1,000,000 with a probability of 25%. Vikram's utility is $U = \sqrt{Y}$, where $Y = \text{income}$.

- (1) What is the expected value of the gamble?
- (2) What is the expected utility of the gamble?
- (3) Will Vikram choose the gamble or the sure thing?

D. (30 pts) Chie consumes two goods, X and Y. Chie's utility function is $U = \ln X + \ln Y$

- (1) What is the marginal rate of substitution between X and Y?
- (2) What is the demand function for X? What is the demand function for Y?
- (3) Given $P_x = 4$, $P_y = 2$, and $M = 20$, graph Chie's budget constraint.
- (4) What are the optimal quantities of X and Y that Chie should choose, given her budget constraint? Show this point on your graph.
- (5) What is the income elasticity for Y? Is it a normal or inferior good?
- (6) Is X a substitute, complement, or unrelated good for Y?

E. (15 pts) Nair Inc. produces hats that are sold to hat distributors. Nair has the production function:

$$Q = 50(K + \ln L)$$

where $Q = \text{output measured in one thousand hat lots}$, $L = \text{labor hours}$,
 $K = \text{machine hours}$. Nair currently pays a wage of \$10/hr, and the rental rate for capital is \$15/hr.

- (1) Does this function exhibit increasing, constant, or decreasing returns to scale? Explain how you figured this out.
- (2) What is the marginal product of labor? What is the marginal product of capital?
- (3) Determine how much labor Nair should use in manufacturing hats.