Multiple Choice: (circle the letter of the best response; 4 points each)

1) The Income Elasticity of Demand for “product X” is estimated to be \( e_{x,i} = 0.27 \). Based upon this value, we can infer that
   a. “product Y” is a complement to “product X.”
   b. “product Y” is a substitute for “product X.”
   c. “product X” is a normal good.
   d. “product X” is an inferior good.
   e. More than one of the above answers is correct.

2) Rory’s marginal utility for pizza
   a. provides a measure of the degree to which he would substitute tacos for pizza.
   b. provides a measure of how his utility changes as he consumes more pizza (with consumption of all other goods fixed).
   c. must be negative if his preferences are “transitive.”
   d. must be equal to zero if his preferences are “monotonic.”
   e. None of the above answers are correct.

3) Consumer’s Surplus
   a. provides a measure of “benefits from consumption” for a consumer.
   b. is the difference between the maximum amount a consumer is willing to pay for a good and the amount actually paid.
   c. should increase if prices decreases (with all other factors fixed).
   d. should decrease if prices increases (with all other factors fixed).
   e. All of the above answers are correct.

4) Consider a market in which demand is given by the function \( D(p) = 100 - 3p \) and supply is given by the function \( S(p) = 2p \). In equilibrium
   a. 20 units will be traded.
   b. 40 units will be traded.
   c. trade will take place at a price of $40 per unit.
   d. there is “excess supply.”
   e. More than one of the above answers is correct.

5) Michelle has income of \( I = 100 \), which she devotes to consumption of \( x_1 \) and \( x_2 \). Each unit of \( x_1 \) costs \( p_1 = 2 \); each unit of \( x_2 \) costs \( p_2 = 5 \). If her income were to increase to \( \bar{I} = 125 \) (with prices fixed), then her budget line would
   a. shift outward.
   b. shift inward.
   c. become steeper.
   d. become flatter.
   e. None of the above answers is necessarily correct.
6) The “Price Consumption Curve (for commodity one)” directly illustrates
   a. the relation between the price of commodity one and the quantity of commodity
      one purchased, all other factors fixed.
   b. the utility maximizing combinations of commodity one and commodity two as
      income is varied, all other factors fixed.
   c. the utility maximizing combinations of commodity one and commodity two as
      the price of commodity one is varied, all other factors fixed.
   d. the relation between price of good one and Consumer’s Surplus.
   e. None of the above answers are correct.

7) Which of the following is NOT one of the “three basic analytical tools” (or “three key
   analytical tools”) upon which nearly all microeconomic analysis relies?
   a. Comparative Statics.
   b. Indirect Utility.
   c. Equilibrium Analysis.
   d. Constrained Optimization.
   e. More than one of the above is NOT one of the “three basic analytical tools.”

8) Consider the market for “Los Angeles Lakers basketball jerseys.” Between 2004 and
   2006 equilibrium price and equilibrium quantity in this market both increased. Which of
   the following are possible explanations of this observed change in equilibrium?
   a. “A decrease in Demand, with no change in Supply.”
   b. “A simultaneous increase in Demand and decrease in Supply.”
   c. “A simultaneous increase in both Demand and Supply.”
   d. “An increase in Supply, with no change in Demand.”
   e. More than one of the above explanations could be correct.

9) Suppose the price of good one decreases, with income and all other prices fixed. The
   Equivalent Variation in Income
   a. specifies the amount of additional income that the consumer would have to be
      given in place of the price decrease, so that she would be just as well off as she is
      after the price decrease with her actual income.
   b. must always be exactly equal to the change in Consumer’s Surplus brought about
      by the price decrease.
   c. will be negative for an inferior good.
   d. is equal to the summation of the distance below the demand curve but above
      price paid over all units of the good which are consumed.
   e. More than one of the above answers is correct.

10) Jason likes both $x_1 = \text{peanut butter}$ and $x_2 = \text{grape jelly}$. He always gets the same
    additional satisfaction from “3 more ounces of peanut butter” as he does from “one more
    ounce of grape jelly.” Which of the following utility functions is consistent with these
    preferences?
    a. $U(x_1, x_2) = 3x_1x_2$
    b. $U(x_1, x_2) = \min\{x_1, 3x_2\}$
    c. $U(x_1, x_2) = x_1 + 3x_2$
    d. $U(x_1, x_2) = \sqrt{x_1} + 3x_2$
    e. Any of the above utility functions is consistent with the stated preferences.
For questions 11 through 13, consider a consumer with preferences consistent with the indifference curves illustrated below. The budget line of this consumer is also illustrated.

11) This consumer considers the bundle \((x_1, x_2) = (35,2)\) to be
   a. exactly twice as good as the bundle \((x_1, x_2) = (15,2)\).
   b. exactly half as good as the bundle \((x_1, x_2) = (35,4)\).
   c. exactly as desirable as the bundle \((x_1, x_2) = (15,4)\).
   d. All of the above statements are correct.
   e. None of the above are correct.

12) If this consumer were to purchase \(x_2 = 4\), how many units of good one could she purchase when spending all of her income?
   a. \(x_1 = 15\).
   b. \(x_1 = 25\).
   c. \(x_1 = 35\).
   d. \(x_1 = 45\).
   e. More than \(x_1 = 15\), less than \(x_1 = 35\), but without additional information we cannot determine the exact maximum level of consumption of good one.

13) In order to maximize utility, this consumer should purchase the bundle
   a. \(X = (15,2)\).
   b. \(X = (15,4)\).
   c. \(X = (15,6)\).
   d. \(X = (35,4)\).
   e. \(X = (45,0)\).
For questions 14 through 16, consider a firm that produces output by using two inputs, \((labor)=L\) and \((capital)=K\). The “\(q = 200\) isoquant” and the “\(q = \bar{q}\) isoquant” are illustrated below.

14) Based upon the shape of the isoquants above, it appears as if
   a. \(MP_L > 0\), but \(MP_K < 0\).
   b. \(MP_K > 0\), but \(MP_L < 0\).
   c. \(MRTS_{L,K}\) is constant.
   d. \(MRTS_{L,K}\) is diminishing.
   e. None of the above answers are correct.

15) Which of the following production functions is possibly consistent with the isoquants illustrated above?
   a. \(F(L, K) = \min\{5L, 10K\}\).
   b. \(F(L, K) = 2L + 6K\).
   c. \(F(L, K) = \frac{\sqrt{10}}{3} L - 10L\).
   d. \(F(L, K) = \frac{\sqrt{2}}{3} LK\)
   e. None of these functions is possibly consistent with the isoquants illustrated above.

16) If this production process is characterized by “Increasing Returns to Scale,” then
   a. \(\bar{q} < 250\).
   b. \(\bar{q} = 250\).
   c. \(\bar{q} > 250\).
   d. \(\bar{q} > 400\).
   e. More than one of the above answers is correct.
17) The “Marginal Product of Labor”
   a. provides a measure of how output changes as more labor is hired (with the level of capital fixed).
   b. provides a measure of how output changes as more capital is hired (with the level of labor fixed).
   c. provides a measure of the rate at which the firm is able to substitute labor for capital, while maintaining a constant level of output.
   d. is always negative for a firm with a Cobb-Douglas production function.
   e. More than one of the above answers is correct.

18) Consider a consumer with utility of \( U(X) = x_1 + x_2 \). If \( p_1 = 2 \), \( p_2 = 3 \), and \( I = 120 \), this consumer would maximize utility by purchasing
   a. 24 units of good one and 24 units of good two.
   b. 0 units of good one and 40 units of good two.
   c. 60 units of good one and 0 units of good two.
   d. 60 units of good one and 40 units of good two.
   e. 2 units of good one and 3 units of good two.

19) Bob’s preferences over \( x_1 \) and \( x_2 \) are transitive and monotonic. Comparing the bundles
   \( A = (4,8) \), \( B = (10,6) \), and \( C = (3,5) \), it must be that
   a. \( A \succ B \).
   b. \( A \succ C \).
   c. \( A \sim B \).
   d. All of the above answers are correct.
   e. More than one, but not all, of the above answers are correct.
20) A consumer with $U(X) = \sqrt{x_1} + \sqrt{x_2}$ maximizes utility by purchasing

\[ x_1^* = \frac{p_2}{p_1} \left( \frac{I}{p_1 + p_2} \right) \text{ and } x_2^* = \frac{p_1}{p_2} \left( \frac{I}{p_1 + p_2} \right). \]

It follows that Indirect Utility is given by the function

\[ a. \quad \frac{p_2}{p_1} \left( \frac{I}{p_1 + p_2} \right) \times \frac{p_1}{p_2} \left( \frac{I}{p_1 + p_2} \right) = \left( \frac{I}{p_1 + p_2} \right)^2. \]

\[ b. \quad \min \left\{ \frac{p_2 \left( \frac{I}{p_1 + p_2} \right)}{p_1 \left( \frac{I}{p_1 + p_2} \right)}, \frac{p_1 \left( \frac{I}{p_1 + p_2} \right)}{p_2 \left( \frac{I}{p_1 + p_2} \right)} \right\}. \]

\[ c. \quad \frac{p_2}{p_1} \left( \frac{I}{p_1 + p_2} \right) + \frac{p_1}{p_2} \left( \frac{I}{p_1 + p_2} \right) = \frac{I(p_1 + p_2)}{p_1 p_2}. \]

\[ d. \quad \frac{p_2}{p_1} \left( \frac{I}{p_1 + p_2} \right) + \frac{p_1}{p_2} \left( \frac{I}{p_1 + p_2} \right) = \frac{I \left[ p_1^2 + p_2^2 \right]}{p_1 p_2 (p_1 + p_2)}. \]

\[ e. \quad \text{None of the above answers are correct.} \]

21) When the price of pizza decreases from $\bar{p} = 10$ to $\hat{p} = 8$ Joe’s monthly consumption of pizza increases from $\bar{q} = 5$ to $\hat{q} = 12$. When decomposing this change into a Substitution Effect and an Income Effect, we see that the Substitution Effect results in a 4 unit increase in his consumption of pizza. From this information, we know that

\[ a. \quad \text{Joe considers pizza to be an inferior good.} \]

\[ b. \quad \text{pizza is a Giffen good for Joe.} \]

\[ c. \quad \text{the Income Effect results in a 3 unit increase in his consumption of pizza.} \]

\[ d. \quad \text{the Income Effect results in an 11 unit increase in his consumption of pizza.} \]

\[ e. \quad \text{More than one of the above answers is correct.} \]
"Short Answer" Question:

1. Noel’s Income Consumption Curve is illustrated below. The current price of cigarettes is $p_c = 5$. Also illustrated are two possible budget lines (given the current price ratio), one associated with a “high level of income” (denoted by $I_H$), the other associated with a “low level of income” (denoted by $I_L$). From the numerical values in the graph below, it could be shown that $I_L = 100$. Answer the following questions based upon this graph.

a. What is the current price per unit of alcohol? Explain. (4 points)
b. If Noel’s actual income is $I_L = 100$, are cigarettes a “normal good” or an “inferior good”? Explain. (6 points)

c. Suppose instead that Noel’s income is $I = 200$. Should his Income Elasticity of Demand for alcohol be positive, negative, or equal to zero? Explain. (6 points)
Extra Credit!

Consider a consumer with utility given by $U(X) = \min\{x_1, x_2\} + \min\{x_3, x_4\}$. Suppose: each unit of good one costs $p_1 = 4$; each unit of good two costs $p_2 = 6$; each unit of good three costs $p_3 = 2$; and each unit of good four costs $p_4 = 10$. If this consumer wants to realize “5 units of happiness” (that is, $U(X) = 5$) as inexpensively as possible, how much money would she have to spend? Clearly explain. (4 points)