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

1) Chad’s preferences over beer and pretzels are “monotonic,” “transitive,” and “convex.” If he is indifferent between $A = (6,10)$ and $B = (2,20)$ (that is, $A \sim B$), then
   a. his utility function must be $U(X) = x_1 + x_2$.
   b. the bundle $C = (4,15)$ is better than bundle $A$.
   c. the bundle $D = (8,12)$ is better than bundle $B$.
   d. All of the above answers are correct.
   e. More than one, but not all, of the above answers is correct.

2) Which of the following inequalities describes the “competitive budget set” (or “set of affordable bundles”) for a consumer?
   a. $U(X) = x_1 + x_2$.
   b. $p_1x_1 + p_2x_2 \leq I$.
   c. $p_1x_1 + p_2x_2 \leq U(X)$.
   d. $U(X) \geq c$.
   e. $p_1 + p_2 \leq x_1 + x_2$.

3) As the price of pizza decreases from $15 to $12 per pie, Brad’s Compensating Variation (in income) is $CV = 21.12$ and his Equivalent Variation (in income) is $EV = 23.60$. From this information alone, we can infer that
   a. pizza is an inferior good for Brad.
   b. pizza is a normal good for Brad.
   c. the corresponding change in Consumer’s Surplus for this price decrease is greater than $23.60$.
   d. the corresponding change in Consumer’s Surplus for this price decrease is less than $21.12$.
   e. More than one of the above answers is correct.

4) Consider the market for lemons. Suppose demand in this market were to increase, with no change in supply. This change would result in
   a. an increase in both equilibrium price and equilibrium quantity.
   b. an increase in equilibrium price but a decrease in equilibrium quantity.
   c. a decrease in both equilibrium price and equilibrium quantity.
   d. an increase in equilibrium price but potentially an increase, decrease, or no change in equilibrium quantity.
   e. None of the above answers are correct.

5) The value of Indirect Utility should
   a. increase if the price of good one were to decrease.
   b. decrease if the price of good two were to increase.
   c. increase if income were to increase.
   d. decrease if income were to decrease.
   e. All of the above answers are correct.
6) The Income Elasticity of Demand for Eggs is $\varepsilon_{I,\text{Eggs}} = 0.44$; the Income Elasticity of Demand for Margarine is $\varepsilon_{I,\text{M Arg}} = -0.20$. From this information alone, we can infer
   a. the demand curve for Margarine is upward sloping.
   b. Eggs and Margarine are complements to each other.
   c. Eggs are a normal good.
   d. an increase in consumer income would lead to an increase in demand for Margarine.
   e. More than one of the above answers is correct.

7) Jim’s marginal utility for beer
   a. provides a measure of how his utility changes as he consumes more beer (with consumption of all other goods fixed).
   b. provides a measure of the degree to which he would substitute wine for beer.
   c. must be negative if his preferences are “monotonic.”
   d. must be negative if beer is an inferior good for him.
   e. None of the above answers are correct.

8) Consider a market in which demand is given by the function $D(p) = 100 - 2p$ and supply is given by the function $S(p) = 3p$. In equilibrium
   a. 20 units will be traded.
   b. 60 units will be traded.
   c. trade will take place at a price of $20 per unit.
   d. there is “excess demand.”
   e. More than one of the above answers is correct.

9) The “Income Consumption Curve” directly illustrates
   a. the price and quantity of trade which will result in a market, due to the interaction of Supply and Demand.
   b. the relation between the price of commodity one and the quantity of commodity one purchased, all other factors fixed.
   c. the utility maximizing combinations of commodity one and commodity two as income is varied, all other factors fixed.
   d. the utility maximizing combinations of commodity one and commodity two as the price of commodity one is varied, all other factors fixed.
   e. None of the above answers are correct.

10) When the price of Pork decreases from $\bar{p} = 4.25$ to $\hat{p} = 3.85$ Joe’s monthly consumption increases from $\bar{q} = 5$ to $\hat{q} = 7$. When decomposing this change into a Substitution Effect and an Income Effect, we see that the Substitution Effect results in a 3 unit increase in his consumption of Pork. From this information, we know that
   a. Pork is an Inferior good for Joe.
   b. Pork is a Normal good for Joe.
   c. Pork is a Giffen good for Joe.
   d. the Income Effect results in a 2 unit increase in his consumption of Pork.
   e. More than one of the above answers is correct.
11) 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.”

12) Consumers’ Surplus can be graphically described as
   a. the point at which the Supply Curve and the Demand Curve intersect.
   b. the height of the Supply Curve at the equilibrium quantity.
   c. the vertical intercept of the demand curve.
   d. the area below the demand curve, but above price, over all units traded.
   e. the area on or below the budget line of a consumer.

13) Thomas has income of $360, which he uses to purchase $x_1 = \text{CDs}$ and $x_2 = \text{DVDs}$.
   Initially, each CD costs $p_1 = $12 and each DVD costs $p_2 = $20. If the price of a CD increases to $p_1' = $15, then his budget line (drawn with $x_1$ on the horizontal axis)
   a. will shift inward, with the slope remaining the same.
   b. will shift outward, with the slope remaining the same.
   c. will become steeper, with the vertical intercept remaining the same.
   d. will become flatter, with the vertical intercept remaining the same.
   e. will not change at all.

14) An Endogenous Variable
   a. is one whose value is taken as given when analyzing an economic system.
   b. is one whose value is determined within the economic system being studied.
   c. is never included in an economic model.
   d. is the only type of variable used in economics models.
   e. None of the above answers are correct.

15) In a “Constrained Optimization Problem,” the “Objective Function” refers to
   a. the set of restrictions on the choice of the decision maker.
   b. the relationship that the decision maker wants to maximize or minimize.
   c. the variables which the decision maker gets to choose the value of.
   d. the variables which the decision maker takes as given when making his decision.
   e. a “stable state,” that will persist as long as factors exogenous to the system remain unchanged.

16) The price elasticity of demand for Airline Travel is $\varepsilon_{x,p} = -1.52$. Based upon this value
   a. a slight increase in price would increase quantity demanded for Airline Travel.
   b. a slight increase in price would increase total consumer expenditures on Airline Travel.
   c. a slight increase in price would decrease total consumer expenditures on Airline Travel.
   d. demand for this good is inelastic.
   e. More than one of the above answers is correct.
17) Jason likes both $x_1 =$ (peanut butter) and $x_2 =$ (grape jelly). He always gets the same additional satisfaction from “2 more ounces of peanut butter” as he does from “one more ounce of grape jelly.” Which of the following utility functions is consistent with this description of his preferences?

a. $U(x_1, x_2) = x_1 + 2x_2$.

b. $U(x_1, x_2) = 2x_1x_2$.

c. $U(x_1, x_2) = \min\{x_1, 2x_2\}$.

d. $U(x_1, x_2) = 2\sqrt{x_1} + x_2$.

e. None of the above utility functions are consistent with the stated preferences.

18) The production process described by the production function $F(L, K) = 4L^{0.74}K^{0.68}$

a. exhibits Increasing Returns to Scale.

b. exhibits Constant Returns to Scale.

c. exhibits Decreasing Returns to Scale.

d. is characterized by a negative Marginal Product of Labor, when a sufficiently large amount of labor is used.

e. More than one of the above answers is correct.

19) $MRTS_{L,K}$ (that is, the “Marginal Rate of Technical Substitution (of labor for capital)”)  

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. does not depend upon the amount of labor and capital hired for a firm with a Cobb-Douglas production function.

e. More than one of the above answers is correct.

20) In the Long Run

a. a firm cannot vary the amount hired of any inputs.

b. the firm can vary the amount hired of some, but not all inputs.

c. the firm can vary the amount hired of all inputs.

d. the firm is never able to minimize costs of production.

e. consumers behave irrationally.
“Short Answer” Questions:

1. Consider a firm with the production function \( q = F(L, K) \). The “\( q = 500 \) isoquant,” the “\( q = 650 \) isoquant,” and a single isocost line are illustrated below. Assume throughout that the per unit price of Capital is \( r = 100 \).

![Graph showing isoquanats and isocost line](image)

a. What is the per unit price of Labor? Explain. (2 points)

b. If the firm is operating in the Long Run and wants to produce \( q = 500 \) units of output, could \( (L, K) = (150,50) \) be the solution to the firm’s Cost Minimization Problem? Explain. (4 points)

c. If the firm is operating in the Short Run with \( K = 50 \) units of capital and wants to produce \( q = 650 \) units of output, what level of labor should the firm hire in order to minimize costs of production? Explain. (4 points)
2. Gene’s utility is given by \( u(X) = 10x_1x_2 \). From here, his marginal utility functions are \( MU_1 = 10x_2 \) and \( MU_2 = 10x_1 \).

a. State an expression for \( MRS_{1,2} \), his “Marginal Rate of Substitution (of good one for good two).” (3 points)

b. Graphically illustrate the solution to his “Utility Maximization Problem.” (3 points)

c. Solve his Utility Maximization Problem (by determining optimal levels of consumption as functions of \( p_1 \), \( p_2 \), and \( I \)). (4 points)
Extra Credit!

Consider a firm with the production function:

\[ F(L_1, L_2, K_1, K_2) = \min\left\{ \frac{1}{3} L_1, \frac{1}{4} K_1 \right\} + \min\left\{ \frac{1}{2} L_2, \frac{1}{3} K_2 \right\}. \]

Suppose: each unit of \( L_1 \) costs \( w_1 = 6 \); each unit of \( L_2 \) costs \( w_2 = 10 \); each unit of \( K_1 \) costs \( r_1 = 5 \); each unit of \( K_2 \) costs \( r_2 = 3 \). Suppose this firm is operating in the Long Run and wants to produce 100 units of output at lowest possible cost. How much of each factor of production should this firm hire? Explain. (4 points)