Multiple Choice:  (circle the correct letter)  (5 points each)

1) Consider a consumer with Cobb-Douglas preferences characterized by the utility function $U(X) = 2\sqrt{x_1 x_2}$. For such a consumer $MU_1 = \frac{x_2}{x_1}$ and $MU_2 = \frac{x_1}{x_2}$.

The preferences of such a consumer:

a. are such that $MRS_{1,2} = \frac{x_2}{x_1}$.

b. are monotonic.

c. are not convex.

d. are such that the bundle $Y = (2,12)$ is preferred to the bundle $Z = (6,6)$.

e. both (a) and (b) are correct.

2) The Law of Demand states:

a. a rational consumer will always purchase a positive amount of more than one commodity.

b. demand is a linear function of price.

c. holding all other factors fixed, there is an inverse relation between price and quantity demanded.

d. holding all other factors fixed, there is a positive relation between price and quantity demanded.

e. None of the above answers are correct.

3) Consider the demand function $Q_D = \frac{100}{p^2}$. For this demand function:

a. the Law of Demand is NOT satisfied.

b. price elasticity of demand is $\varepsilon_{q,p} = -\left(\frac{100-q}{q}\right)$.

c. price elasticity of demand is $\varepsilon_{q,p} = -2$.

d. The choke price is 100.

e. None of the above answers are correct.
4) Consider a consumer with \( U(X) = \min\{2x_1, x_2\} \). For such a consumer:

a. \( MRS_{1,2} = \sqrt{\frac{x_2}{x_1}} \).

b. the optimal bundle is such that \( p_1x_1 + p_2x_2 = I \).

c. any bundle such that \( 2x_1 = x_2 \) is optimal.

d. any bundle such that \( x_1 = 2x_2 \) is optimal.

e. the bundle \( X = (4, 8) \) is optimal for a consumer with \( I = 12 \).

f. More than one, but not all, of the above answers are correct.

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True or False: (circle TRUE or FALSE) (5 points each)

1) TRUE or FALSE: When monotonicity is satisfied, indifference curves are negatively sloped and the level of well-being is greater further from the origin.

2) TRUE or FALSE: A market is in equilibrium whenever quantity supplied is positively related to price.

3) TRUE or FALSE: If supply increases and demand decreases, then the equilibrium price can either increase or decrease.

4) TRUE or FALSE: If the income of a consumer decreases, holding prices constant, then the strict upper contour set to the bundle \( X \) must become smaller.

5) TRUE or FALSE: An endogenous variable is one whose value is taken as given in a model.

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Problems and/or short answer questions:

1) Qihong has utility for \( x_1 \) and \( x_2 \) given by \( U(X) = x_1x_2 \). As a result, \( MU_1 = x_2 \) and \( MU_2 = x_1 \).

   i) Determine \( MRS_{1,2} \). (5 points)
ii) Given a choice between \( Y = (4,4) \) and \( Z = (6,3) \), which would Qihong prefer? Clearly explain. \((6\ points)\)

iii) Suppose \( p_1 = 1 \), \( p_2 = 4 \), and \( I = 80 \). Determine the optimal consumption bundle for Qihong. \((8\ points)\)

2) Consider a market for which inverse demand is \( P_D(q) = 100 - 3q \) and inverse supply is given by \( P_S(q) = 2q \).

i) Determine the equilibrium price and quantity. \((8\ points)\)

ii) If supply were to increase (with demand unchanged), how would the equilibrium price and quantity change? Explain. \((4\ points)\)
iii) If supply were to decrease (with demand unchanged), how would the equilibrium price and quantity change? Explain. (4 points)

iv) Suppose supply changes so that now inverse supply is $\hat{P}_S(q) = q$. Does this change correspond to an increase or decrease in supply? Explain. (4 points)

v) Determine the equilibrium price and quantity when supply is given by the inverse function $\hat{P}_S(q)$. (8 points)

vi) Are your answers to parts (i) through (v) consistent with each other? Explain. (8 points)