1. [20%] Suppose the utility function \( U(x, y) = xy \). Let \( p_y = 1 \).
   
   (a). Compare the slope of compensated demand curve for \( x \) with that of ordinary demand curve.
   
   (b). Suppose income is $100 and the \( p_x \) falls from $1 to $0.25 due to a success of a good project. Determine the consumers’ gain in terms of compensating variation (CV) and equivalent variation (EV).
   
   (c). Set the pre-project price index at unity, what is the price index for \( U = U^0 \) after the project?
   
   (d). Suppose the price of \( y \) had risen to $2.25 at the same time as consumers’ gain (in terms of CV) occurs. Is this sufficient to cancel out the advantages of the fall in the price of \( x \)?

2. [15%] Let the buyer and seller for the bilateral monopoly have the production functions \( q_1 = 270q_2 - 2q_2^2 \) and \( x = 0.25q_2^2 \), respectively. Assume that the price of \( q_1 \) is 3 and the price of \( x \) is 6.
   
   (a). Determine the values of \( q_2 \) and \( p_2 \).
   
   (b). Determine the profits of the buyer and seller for the monopoly, monopsony, and quasi-competitive solutions.
   
   (c). Determine the bargaining limits for \( p_2 \) under the assumption that the buyer can do no worse than the monopoly solution and the seller can do no worse than the monopsony solution.

3. [15%] Given the following open-economy model:
   
   \[
   C_t = a + bY_{t-1},
   \]
   
   \[
   I_t = hY_{t-1} + I_0 + \Delta I,
   \]
   
   \[
   X_t = X_0 + \Delta X,
   \]
   
   \[
   M_t = mY_{t-1} + M_0, \quad 0 < m < 1,
   \]
   
   \[
   Y_t = C_t + I_t + X_t - M_t.
   \]
   
   (a). If trade is initially balanced (i.e., \( X=M \)), under what circumstances will the induced increase in imports exactly offset the exogenous increase in exports?
   
   (b). Is the condition in (a) stable?

4. Multiple choice [18%]
   
   (1) A competitive market structure differs from the monopoly, oligopoly, and monopolistic competition structures in the (A) producers’ ability to set price. (B) profit maximization condition. (C) amount of long run profit. (D) entry conditions.
(2) The term prisoners' dilemma refers to a game in which (A) there are no Nash equilibria. (B) there are no dominant strategies. (C) the payoff from playing the dominant strategy is the same for each player. (D) the payoff from playing the dominant strategy is not the highest payoff possible.

(3) To increase commercial bank lending the Fed can (A) raise the required reserve ratio, lower the discount rate, or sell government securities. (B) raise the required reserve ratio, raise the discount rate, or sell government securities. (C) lower the required reserve ratio, lower the discount rate, or buy government securities. (D) lower the required reserve ratio, raise the discount rate, or buy government securities.

(4) A firm may decide to vertically integrate backward if (A) the transaction costs of dealing with the supplier are very low. (B) the transaction costs of dealing with the supplier are very high. (C) the cost of managing the new division would be very high. (D) there are many suppliers from which to choose.

(5) Selling the same product under different brand names allows a firm to price discriminate as long as (A) customers know the products are identical. (B) customers do not know the products are identical. (C) the products really are not the same. (D) the firm lets customers know that the products are identical.

(6) Suppose that the US interest rate is 5 percent and the Japanese interest rate is 1 percent. The effect of this discrepancy on foreign exchange markets is that (A) all funds flow to the US to get the higher interest rate. (B) a Japanese investor is guaranteed to make an additional 4 percent in yen terms by investing in the United States. (C) investors expect the yen to appreciate against the dollar. (D) investors expect the yen to depreciate against the dollar.

5. [20%] There are four oligopolists operating in a market with inverse demand function, \( P(Q) = a - Q \), where \( Q = q_1 + q_2 + q_3 + q_4 \) and \( q_i \) is the quantity produced by firm \( i \). Each firm has a constant marginal cost, \( c \), and no fixed cost. The firms choose their quantities as follows: (1) firm 1 chooses \( q_1 \geq 0 \); (2) firms 2, 3 and 4 observe \( q_1 \) and then simultaneously choose \( q_2, q_3 \) and \( q_4 \), respectively. What are the subgame perfect results of the firms' quantities produced and profits?

6. [12%] Define the following terms:
   (a) Formosa bond   (b) Private placement    (c) Real interest rate