Homework #5
Due: 7-16-07
APEC 3001
Applied Microeconomics:
Consumers, Producers, and Markets
(Summer 2007)
Instructor: Hurley

Please show all the work you do to solve a problem.

1. How do the Cournot and Bertrand duopoly models differ? Which model results in a higher price? Which results in a higher quantity?

2. What are two important differences between a monopoly and monopolistic competition?

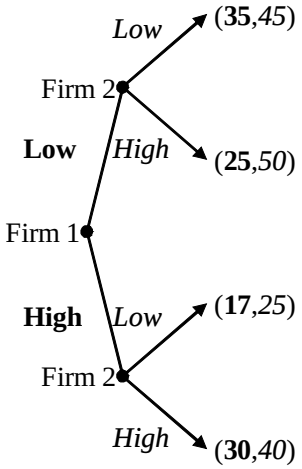
3. What is a Pareto optimal allocation?

4. What is the First Welfare Theorem?

5. In the Table below, Firm 1 gets to choose the row by choosing either **Up** or **Down**, while Firm 2 gets to choose the column by choosing either *Right* or *Left*. Firm 1's profits are denoted in **bold**, while Firm 2's profits are denoted in *italics*. What is the Nash equilibrium strategy for each firm?
   a. Firm 1 choosing **Up** and Firm 2 choosing *Right*.
   b. Firm 1 choosing **Up** and Firm 2 choosing *Left*.
   c. Firm 1 choosing **Down** and Firm 2 choosing *Right*.
   d. Firm 1 choosing **Down** and Firm 2 choosing *Left*.

		Firm 2	
		Left	*Right*
Firm 1	**Up**	*75* **120**	*50* **150**
	Down	*100* **90**	*150* **125**

6. Consider the game in the figure below. Firm 1 chooses a **High** or **Low** output. Firm 2 then gets to choose a *High* or *Low* output after seeing Firm 1's choice. Firm 1's profit is the first number in parentheses in **Bold**, while Firm 2's profit is the second number in parentheses in *italics*. What are Firm 1's and Firm 2's equilibrium strategies?
   a. Firm 1 chooses **Low** and Firm 2 choose *Low* if Firm 1 chooses **Low** and *High* if Firm 1 chooses **High**.
   b. Firm 1 chooses **Low** and Firm 2 choose *High* if Firm 1 chooses **Low** and *High* if Firm 1 chooses **High**.
   c. Firm 1 chooses **High** and Firm 2 choose *Low* if Firm 1 chooses **Low** and *High* if Firm 1 chooses **High**.
   d. Firm 1 chooses **High** and Firm 2 choose *High* if Firm 1 chooses **Low** and *High* if Firm 1 chooses **High**.



7. Suppose demand is $P = 300 – 5Q$ and that there are only two firms that produce for this market such that $Q = Q_1 + Q_2$ where Q_1 is Firm 1's output and Q_2 is Firm 2's output. If these firms have identical marginal costs $MC_1 = MC_2 = 60$, what is the Stackelberg equilibrium price (P^*) and industry output (Q^*) if firm 1 chooses its output first?
   a. $P^* = 60$ and $Q^* = 48$.
   b. $P^* = 120$ and $Q^* = 36$.
   c. $P^* = 140$ and $Q^* = 32$.
   d. $P^* = 180$ and $Q^* = 24$.

8. Which of the following conditions below, does **not** have to hold for a Pareto optimal allocation of resources in a general equilibrium with production?
   a. Firms must equate their marginal rates of technical substitution.
   b. Consumers must equate the marginal rates of substitution.
   c. Marginal rates of technical substitution must equal the marginal rate of transformation.
   d. Marginal rates of substitution must equal the marginal rate of transformation.

9. Suppose we have an exchange economy with only two people, Mason and Spencer, and two goods, candy and gum. Mason's utility function is $U_M = C_M^{0.5}G_M$ where C_M and G_M are the quantity of candy and gum Mason consumes. Spencer's utility function is $U_S = C_S G_S^{0.5}$ where C_S and G_S are the quantity of candy and gum Spencer consumes.
   a) Find Mason's marginal rate of substitution: $MRS^M = MU_G^M/MU_C^M$ where MU_G^M and MU_C^M are Mason's marginal utility of gum and candy. Find Spencer's marginal rate of substitution: $MRS^S = MU_G^S/MU_C^S$ where MU_G^S and MU_C^S are Spencer's marginal utility of gum and candy.
   b) Suppose Dana gives Mason and Spencer each 75 pieces of candy and 75 pieces of gum. Show why this is not a Pareto efficient allocation of candy and gum.
   c) Suppose Dana allowed Mason and Spencer trade candy and gum provided the price of gum is \$0.01 and the price of candy is \$0.01. Show whether or not allowing this trade at these prices will result in a Pareto efficient allocation of candy and gum.

10. Suppose we have two firms that produce similar but not identical products, so they behave as monopolistic competitors. The Demand for Firm 1's product is $P_1 = 150 - 5Q_1 - 10Q_2$. The Demand for Firm 2's product is $P_2 = 200 - 10Q_2 - 10Q_1$. For simplicity, assume constant marginal costs equal to 0.
    a) Find each firm's total and marginal revenue.
    b) Derive each firm's reaction/best response function.
    c) Find the Nash equilibrium quantity and price for each firm.