ECON 425
Assignment #3

Consider the following duopoly market where the market demand curve is given by

$$p = 120 - (q_1 + q_2)$$

where q_1 and q_2 are the outputs of firm 1 and firm 2 respectively.

Firm $1's$ cost function is

$$C_1 = K_1 + 35q_1$$

and firm $2's$ cost function is

$$C_2 = K_2 + 40q_2$$

Where K_1, and K_2 are set up costs that are sunk costs upon entry.

1. Assume that Firm one is already in the industy (leader) and firm two is the (potential) entrant (you can let $K_1 = 0$ since it is sunk)

   (a) Assume that the entrant expects a Stackleberg equilibrium. Solve for the equilibruim quantities and price. Also find each firm's profit as a function of K_i What value of K_2 would keep firm2 out?

   (b) Assume that the entrant expects a Cournot equilibrium. Solve for the equilibruim quantities and price. Also find each firm's profit as a function of K_i What value of K_2 would keep firm2 out?

   (c) Assume firm one is going to adopt a limit output strategy. Find the limit output as a function of K_2. Find the value of K_2 that makes firm one indifferent between limit strategy and letting the entrant in (this means comparing your limit output profit to your answers in (a) and (b)

2. Now suppose both firms are deciding to enter the market. First they choose a technology (one of the two cost functions above).then they play a cournot game. However, firm one gets to choose a technology and enter first. Firm two chooses second and then enters.

   (a) Draw the game tree for all possible choices.

   (b) Find the range of values of K_1 and K_2 such that Firm one would choose C_1 (knowing what firm two will choose) and that, once firm one has chosen, firm two chooses C_2