Day 5: Homework

Question 1: Calculate the Nash Equilbrium for the Duopoly model we did in class. If there were parts of the calculation today where you got confused, you can look at the lecture notes and videos in this website where the professor does the same example.: `http://oyc.yale.edu/economics/econ-159/lecture-6`

Question 2: Calculate the total profit (adding the profit of both firms) for the Nash equilbrium. Compare it with the total profit for monopoly (Activity 5, where $Q_2 = 0$ and $Q_1 = \frac{\alpha-\gamma}{2\beta}$) and the total profit for total competition (Activity 6, where $Q_1 = \frac{\alpha-\gamma}{\beta}$ and $Q_2 = 0$.)

We will introduce another model for duopoly, known as the *Bertrand model*. In this model, the companies control the prices, rather than the quantity of goods they produce.

Assume McDonald's and Burger King are two companies that produce an identical burger. Each burger costs γ cents to produce. Assume that their customers care about price and nothing else (they will buy the burger with the cheapest price). McDonald's strategy is to set its price at P_1 cents, and Burger King's strategy is to set its price at P_2 cents. Assume that P_1, P_2 don't have to be whole numbers!

Question 3:

- If you are the McDonald's boss, and you know Burger King is pricing their burgers at P_2 cents (where $P_2 > \gamma$) at what price should you sell your burgers?
- Identify the Nash equilibria for this model.

Question 4: The results of the Bertrand model don't seem realistic! Explain why not, and think of some ways to improve the model.