Econ 302
Tutorial 4

1. Consider a Cournot duopoly where firm 1 faces cost of the form $c_1(y_1) = y_1^2$ and firm 2 faces cost of the form $c_2(y_2) = 2y_2^2$. The inverse demand function is given by $P = 10 - 2Y$ where $Y = y_1 + y_2$.

(a) State the maximization problem of firm 1 and use the first order condition to derive firm 1's reaction function.

(b) State the maximization problem of firm 2 and use the first order condition to derive firm 2's reaction function.

(c) Solve the 2×2 system of reaction function to find the optimal levels of production for firm 1 and firm 2.

(d) Find the market quantity, the market price, and firms' profits. Show your results graphically.

2. Consider a Cournot duopoly where firm 1 faces cost of the form $c_1(y_1) = y_1^2$ and firm 2 faces cost of the form $c_2(y_2) = 2y_2^2$. The inverse demand function is given by $p = 10 - 2Y$ where $Y = y_1 + y_2$. The two firms have realized that competition decreases their profit and they decide to form a cartel.

(a) State the maximization problem of the cartel.

(b) Derive the first order conditions and use them to find the optimal levels of production for the two firms under the cartel agreement.

(c) Find the market quantity, the market price, and the cartel's profits. Discuss how the firms will split the profit.

3. Consider a Cournot duopoly where firm 1 faces cost of the form $c_1(y_1) = y_1$ and firm 2 faces cost of the form $c_2(y_2) = 2y_2$. The inverse demand function is given by $p = 10 - 2Y$ where $Y = y_1 + y_2$. The two firms have realized that competition decreases their profit and they decide to form a cartel.

(a) State the maximization problem of the cartel.

(b) Derive the first order conditions and use them to find the optimal levels of production for the two firms under the cartel agreement. Do you get an answer? Discuss your result. How much will the cartel produce?

(c) Find the market quantity, the market price, and the cartel's profits. Discuss how the firms will split the profits.