ECON 444 Problem Set 5

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1 Problem 1

Problem Constrains:

- Cournot Competition (quantity static)
- Market Demand: $P = 10 - 2Q$
- $\text{MC}_1 = 2$
- $\text{MC}_2 = 4$
- $Q = q_1 + q_2$

1.1 Part a

To find best response behavior of each firm, we acknowledge that the firms wish to set MR equal to MC to optimize profits.

$$MR = p * q$$

$$MR_1 = \frac{d((10 - 2(q_1 + q_2)) * q_1)}{dq_1} = \frac{d(10q_1 - 2q_1^2 - 2q_1q_2)}{dq_1} = 10 - 4q_1 - 2q_2$$

$$MR_2 = \frac{d((10 - 2(q_1 + q_2)) * q_2)}{dq_2} = \frac{d(10q_2 - 2q_2^2 - 2q_2q_1)}{dq_2} = 10 - 4q_2 - 2q_1$$

Best Response for firm 1:

$$MR_1 = MC_1$$
$$10 - 4q_1 - 2q_2 = 2$$
$$4q_1 = 10 - 2q_2 - 2$$
$$q_1^* = \frac{1}{4}(8 - 2q_2)$$

Best Response for firm 2:

$$MR_2 = MC_2$$
$$10 - 4q_2 - 2q_1 = 4$$
$$4q_2 = 10 - 2q_1 - 4$$
$$q_2^* = \frac{1}{4}(6 - 2q_1)$$

1.2 Part b

1.3 Part c

1.4 Part d

1.5 Part e

1.6 Part f

2 Problem 2

3 Problem 3

3.1 Part a

3.2 Part b

4 Problem 4

4.1 Part a

4.2 Part b

4.3 Part c

5 Problem 5

5.1 Part a

5.2 Part b