Microeconomics

Part I: Multiple choice questions

Question	Answer
1	D
2	B
3	B
4	A
5	C
6	C
7	A
8	D
9	C
10	D
11	D
12	C
13	B
14	B
15	A
16	A
17	C
18	C
19	A
20	C

Part II: Longer questions

I answered questions: 2 and 3

2. Supply side

a)

We first find the profit maximizing quantity by finding the average cost and taking the derivative of it, setting it equal to 0:

$AC(q) = 32*q^{-1} + 2q$

$AC'(q) = -32q^{-2} + 2 = 0$

$2q^2 = 32$

$q = 4$

We can now set up the profit function, where total revenue and total cost must be identical, as this means a profit of 0:

$4p = 32+2(4)^2$

$4p = 64$

P = 16

The minimum price must be 16 for the firm to earn nonnegative profits in the short run.

b)

We know that Babette's Baguettes produces 4 units at a price of 16. This means that the supply from Babette's Baguettes is the square root of the price, Q = sqrt(p).

We have 400 identical firms, which means that the total market supply is 400 times that of Babette's Baguettes. This means that the total market supply is: **Q = 400*sqrt(p).**

c)

We find the profit maximizing quantity by finding the average cost and taking the derivative of it, setting it equal to 0:

$AC(q) = q^2 – 16q + 109$

$AC'(q) = 2q – 16 = 0$

$q = 8$

For a competitive firm, MC = p, so we derive the marginal cost function from the total cost function and find the price:

$3(8)^2 - 32(8) + 109 = p$

p = 45

The long run equilibrium price is 45.

d)

We now know the equilibrium price and we can insert this into the demand function to find the quantity demanded by the whole market:

$Q = 2050 – 10(45) = 1600$

The total quantity demanded by the market is 1600, and we know from earlier that each firm produces 8. We can now find the number of firms in the market by dividing the total equilibrium quantity demanded by the production from each firm:

1600/8 = **200**

There are 200 firms in the market in the long run equilibrium.

e)

In a perfectly competitive market, which is what Babette’s Baguettes is competing in, the individual firm is a price taker. This means that Babette’s Baguettes faces a horizontal demand curve. Therefore, if she raises the price, demand falls to 0, assuming she sells an identical product, which is the case here. She does not increase price, as she would lose all revenue.

Every firm in a competitive market makes zero economic profits in the long run, although they might make an accounting profit. Therefore, there is no reason for Babette’s to exit the market unless they can enter a market with nonperfect competition such as oligopolies or monopolies, where they do make an economic profit, but entry to these markets is often restricted.

3. Monopoly, Duopolies, Game Theory

a) We know that any firm, even a monopoly, sets its marginal cost equal to its marginal revenue, MC = MR. We also know that the MR curve has twice the slope of the inverse market demand, and we can use this to find the quantity, Q:

$MR = 180 – 4q$

$MC = 2q + 90$

We now set MC = MR and solve for q:

$180 - 4q = 2q + 90$

$6q = 90$

$q = 15$

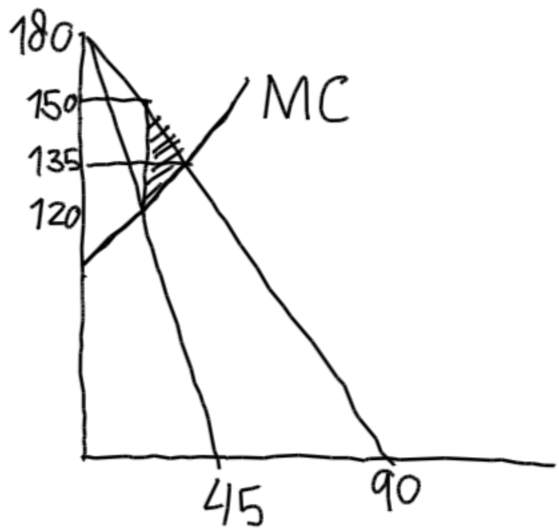
To determine p, we insert q into the inverse market demand:

$P = 180 - 2(15) = 150$

(q,p) = (15,150)

Quantity is 15 and price is 150 in this market.

We can illustrate the deadweight loss caused by the monopoly graphically as seen below:



Here the marked triangle represents the deadweight loss. We can calculate the area of this triangle:

0,5 * (150-120) * (22,5-15) = **112,5**

In this case, 22,5 is the competitive equilibrium quantity attained from solving 180-2q = 2q + 90.

This means that the monopoly causes a deadweight loss of 112,5.

b)

Considering that they simultaneously set price, we calculate the Bertrand equilibrium:

We are already given the demand function, and so we start by setting up the profit function for Peter:

Profit = $p_p * (420 - 2p_p + p_A) - 0 = 420p_p - 2p_p^2 + p_p p_A$

We now find marginal profit and set it equal to 0 and solve for p_p to find the best response function for Peter:

$MP = 420 – 4p_p + p_A = 0$

$p_p = 105 + 0,25p_A$

Now we do the exact same for Alicia:

Setting up the profit function:

$Profit = p_A * (420 – 2p_A + p_p) – 0 = 420p_A – 2p_A^2 + p_Ap_p$

Setting MP = 0 and solving for p_A:

$420 – 4p_A + p_p = 0$

$p_A = 105 + 0,25p_p$

We now have two equations with two unknowns, which we can solve to find p_A and p_p:

$p_p = 105 + 0,25(105+0,25p_p)$

$p_p = 105 + 26,25 + (1/16)*p_p$

$(15/16)*p_p = 131,25$

$P_p = 140$

We can now find p_A:

$p_A = 105 + 0,25(140) = 140$

Now we can plug the prices into the demand functions to find the quantities:

$q_p = 420 – 2(140) + 140 = 280$

$q_A = 420 – 2(140) + 140 = 280$

They will each produce 280 and the price will be 140 if they set their price simultaneously.

We now have two equations with two unknowns that we can solve together to find p_p and p_A:

$p_p = 50 + (1/8)*(200 + 0,5p_p)$

$p_p = 50 + 25 + (1/16)*p_p$

$p_p = 80$

We can now find p_A:

$p_A = 200 + 0,5(80) = 160$

We can now plug the prices into the demand functions to find the quantities:

$q_p = 200 – 2(80) + 0,5(160) = 120$

$q_A = 600 – 1,5(160) + 1,5(80) = 480$

Alicia now produces 480 at a price of 160, while Peter produces 120 at a price of 80, if they still set their prices simultaneously.

d)

We can determine their best responses given each strategy:

If Peter chooses no seating: Alicia chooses no seating.

If Peter chooses seating: Alicia chooses seating.

If Alicia chooses no seating: Peter chooses seating.

If Alicia chooses seating: Peter chooses no seating.

We can also find the mixed strategy equilibrium:

We know that Alicia chooses her probability of no seating, x, such that the expected payoffs for Peter are the same no matter which strategy he chooses:

$x*0 + (1-x)*7 = x*2 + (1-x)*6$

$7 – 7x = -4x + 6$

$3x = 1$

$x = 1/3$

The probability that Alicia chooses no seating is 1/3, and the probability that she chooses seating must therefore be 2/3.

We do the exact same for Peter. He also chooses his probability of no seating, y, such that the expected payoffs for Alicia are the same no matter which strategy she chooses:

$y*2 + (1-y)*1 = y*0 + (1-y)*6$

$y + 1 = 6 – 6y$

$7y = 5$

$y = 5/7$

The probability that Peter chooses no seating is 5/7, and the probability that he chooses seating must therefore be 2/7.