Microeconomics – Exam

Part I: Multiple Choice Questions:

The multiple-choice question answers are in the attachment but have also been duplicated here for ease of correction.

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	B

Part 2: Longer questions

For part 2, I will do the questions on the Demand Side and on the Supply Side.

1. Demand Side

a) Her marginal utility of espresso is:

$$MU_E = \frac{dU}{dE} = 20 - 2E$$

and

$$MU_C = \frac{dU}{dC} = 80 - 4C$$

so

$$MRS = -\frac{MU_E}{MU_C} = -\frac{20-2E}{80-4C} = -\frac{10-E}{40-2C} = \frac{E-10}{40-2C}$$

The Marginal Rate of Substitution is the amount of a good that a consumer will trade to gain one more of another. Thus in this case, if Fie buys more Espressos (i.e. E increases) she would need less candy bars than before to want to make the trade.

b) We now set up the Lagrangian to maximize her utility:

$$\max_{C,E,\lambda} \mathcal{L} = U(C,E) + \lambda(\bar{Y} - p_C C - p_E E)$$

so

$$\max_{C,E,\lambda} \mathcal{L} = 20E + 80C - E^2 - 2C^2 + \lambda(41 - 2C - E)$$

The first order conditions are:

$$\frac{d\mathcal{L}}{dC} = 80 - 4C - 2\lambda = 0$$

$$\frac{d\mathcal{L}}{dE} = 20 - 2E - \lambda = 0$$

$$\frac{d\mathcal{L}}{d\lambda} = 41 - 2C - E = 0$$

c) We then use the first orderconditions to find Fie's optimal consumption bundle:

$$80 - 4C - 2\lambda = 0$$

So

$$80 - 4C = 2\lambda$$

$$40 - 2C = \lambda$$

And

$$20 - 2E - \lambda = 0$$

So

$$20 - 2E = \lambda$$

We put these expressions of λ together:

$$\lambda = 40 - 2C = 20 - 2E$$

So

$$40 - 2C = 20 - 2E$$

$$20 = 2C - 2E$$

$$10 = C - E$$

$$10 + E = C$$

Weset this value into the last first order condition:

$$41 - 2C - E = 0$$

So

$$41 - 2(10 + E) - E = 0$$

$$21 - 3E = 0$$

$$E = \frac{21}{3} = 7$$

So

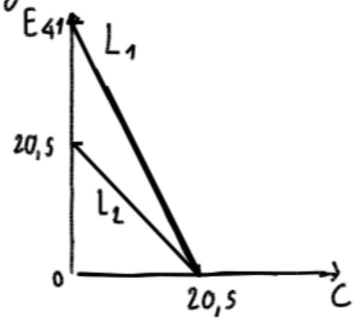
$$C = 17$$

The optimal bundle given the budget constraint is to buy 7 espressos and 17 candy bars

The utility given this optimal consumption is:

$$U_{\text{[redacted]}}(17,7) = 20 \times 7 + 80 \times 17 - 7^2 - 2 \times 17^2$$
$$= 140 + 1360 - 49 - 578$$
$$= 1500 - 627$$
$$= 873$$

d) The following graph shows the new and the old budget constraint:



A doubling of the price of espressos causes Fie's budget line to rotate from L_1 to L_2.

We calculate Fie's new optimal bundle using the fact that MRS = MRT for the optimal bundle:

$$\frac{E-10}{40-2C} = -\frac{2}{2}$$

So
$$E-10 = 2C-40$$
$$30 = 2C-E$$
$$E = 2C-30$$

We then set this into her new budget constraint

$$Y = 2C + 2E$$

So $Y = 2C + 2E$ is equivalent to

$$Y = 2C + 2(2C - 30)$$
$$41 = 2C + 4C - 60$$
$$101 = 6C$$

So $C = 16{,}83$ and then $E = 2 \times 16{,}83 - 30$
$E = 3{,}67$

Due to this new espresso price, Fie would consume 16,83 candy bars and 3,67 espressos.

e) To maintain the same consumption bundle as before Fie would need to have a budget of:

$$Y = 17 \times 2 + 7 \times 2$$
$$Y = 34 + 14$$
$$Y = 48$$

Fie's boss would need to give her 7€ more every week.

However if Fie had 48€ per week she would choose another bundle. Her new budget constraint wold be:

$$Y = 2C + 2E$$
$$48 = 2C + 2(2C - 30)$$
$$48 = 2C + 4C - 60$$
$$108 = 6C$$

So $C = 18$ and then $E = 2 \times 18 - 30 = 6$.

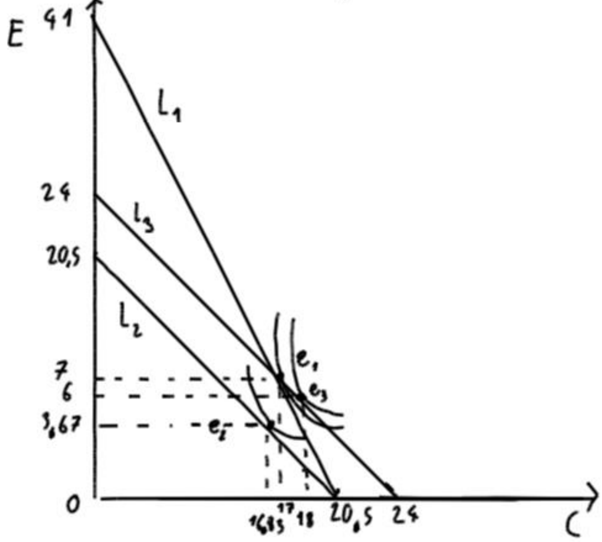
Her new optimal bundle would be 18 candy bars and 6 espressos.

Fie's utility if her boss agrees to the raise would be : $U(18, 6) = 20 \times 6 + 80 \times 18 - 6^2 - 2 \times 18^2$

$$= 120 + 1440 - 36 - 648$$

$$= 876$$

She doesn't consume the same bundle because of the relative price change and the substitution of goods. Her old optimal bundle is not the same as ~~[illegible]~~ new one with the new budget constraint. She has been over compensated because her utility has increased.



L_3 is the budget line where the budget is 48 € and espressos cost 2 €. e_1 has coordinates (17; 7), e_2 (16,83; 3,67) and e_3 (18; 6).

2. **Supply Side**

a) For the firm not to have negative profits then the revenue must be at least equal to the costs, so in the short run we set:

$$pq = 32 + 2q^2$$

However, we know that $p = MC$ in a competitive market, so instead we find the point where $MC = AC$:

$$MC = AC$$
$$4q = \frac{32}{q} + 2q$$
$$2q = \frac{32}{q}$$
$$2q^2 = 32$$
$$q^2 = 16$$
$$q = 4$$

Then we put this in the first equation to find the price:

$$p \times 4 = 32 + 2 \times 4^2$$
$$4p = 64$$
$$p = 16$$

The minimum price for non-negative profits is 16.

b) The market supply is:

$$Q_S = n \times q$$
$$Q_S = 400 \times 4 = 1600$$

And we know that $p = MC = 4q$ so $q = \frac{p}{4}$
and as $Q_S = n \times q = 400 \times \frac{p}{4} = 100p$

c) In the long run, $p = MC = AC$ so:

$$MC = AC$$
$$3q^2 - 32q + 109 = q^2 - 16q + 109$$
$$2q^2 = 16q$$
$$q = 8$$

So $p = AC = 8^2 - 16 \times 8 + 109 = 64 - 128 + 109 = 45$

d) $Q_d = 2050 - 10p$

We plot the price we found:

$$Q_d = 2050 - 10 \times 45 = 1600$$

We know that at this price the individual firm supplies 8 baguettes, and $Q = nq$

So $1600 = n \times 8$

and $n = 200$.

In the long-run equilibrium there will be 200 firms in the market.

e) Babette doesn't increase her price because she is in a competitive market and is therefore a price taker. If she increases her prices then a new firm will come into the market and sell instead of her at $p = MC = AC$. There will be no demand meeting her supply. The choice of quitting the market depends on her opportunity cost and therefore her economic profit and not her business profit (which is the one we calculate). If her economic profit is negative then she should stop selling baguettes.