Assignment 5: correction

Question 1

Question 1.1 If the price is \( p \), and the baker is a price-taker, he seeks to maximise profit, that is, the function \( q \rightarrow pq - \frac{1}{2}q^2 \). To maximise this function you annul the derivative, which is \( p - q \). Writing \( p - q = 0 \) yields \( q = p \): this is the quantity each baker produces. All bakers together produce 100 times more, so the demand is 100\( p \).

Question 1.2 Equilibrium price is obtained by writing that supply equals demand:
\[
S(p) = D(p)
\]
Supply is 100\( p \), as we saw, and demand is 1000 \( \left( 1 - \frac{1}{10}p \right) \). Equating, we get:
\[
100p = 1000 \left( 1 - \frac{1}{10}p \right)
\]
\[
p = 10 - p
\]
\[
p = 5
\]

Question 1.3.a If the market price is \( p \), the price to the consumer is \( p - 1 \), so the demand function is \( D(p - 1) \). The equilibrium equation \( S(p) = D(p - 1) \) becomes:
\[
100p = 1000 \left( 1 - \frac{1}{10} (p - 1) \right)
\]
\[
p = 10 - p + 1
\]
\[
p = 5, 5
\]
So the consumer pays 5, 5 for each loaf. Taking account of the government subsidy, the true price for her is 4, 5.

Question 1.3.b If the market price is \( p \), the profit of the baker, taking account of the government subsidy, is \( p + 1 \). So the supply function is \( S(p + 1) \). The equilibrium equation \( S(p + 1) = D(p) \) becomes:
\[
100(p + 1) = 1000 \left( 1 - \frac{1}{10} \right)
\]
\[
p + 1 = 10 - p
\]
\[
p = 4, 5
\]
So the consumer pays 4, 5 for each loaf. The two procedures give the same result. Note that in either case, only 50% of the subsidy is reflected in the price of bread. The rest is captured by the bakers.
Question 2

**Question 2.a** This equation expresses that the monopolist captures the whole demand

**Question 2.b** This expresses that the monopolist maximises profit

**Question 2.c** Substituting in the equation \( D(p) = 1000 \left( 1 - \frac{1}{10} p \right) \) and \( D'(p) = -100 \), we get:

\[
-100p + 1000 \left( 1 - \frac{1}{10} p \right) - \frac{1}{100} 1000 \left( 1 - \frac{1}{10} p \right) = 0
\]

\[
-100p + 990 \left( 1 - \frac{1}{10} p \right) = 0
\]

\[
-p + 9,9 \left( 1 - \frac{1}{10} p \right) = 0
\]

\[
1,99p = 9,9
\]

The new market price for bread is \( p = 4.97 \)