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 $q \to pq - \frac{1}{2}q^2$. 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 $100p$

Question 1.2 Equilibrium price is obtained by writing that supply equals demand:

$$S(p) = D(p)$$

. Supply is $100p$, as we saw, and demand is $1000\left(1 - \frac{1}{10}p\right)$. Equating, we get:

$$\begin{aligned} 100p &= 1000\left(1 - \frac{1}{10}p\right) \\ p &= 10 - p \\ p &= 5 \end{aligned}$$

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:

$$\begin{aligned} 100p &= 1000\left(1 - \frac{1}{10}(p-1)\right) \\ p &= 10 - p + 1 \\ p &= 5,5 \end{aligned}$$

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:

$$\begin{aligned} 100(p+1) &= 1000\left(1 - \frac{1}{10}\right) \\ p+1 &= 10 - p \\ p &= 4,5 \end{aligned}$$

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:

$$\begin{aligned} -100p + 1000\left(1 - \frac{1}{10}p\right) - \frac{1}{100}1000\left(1 - \frac{1}{10}p\right) &= 0 \\ -100p + 990\left(1 - \frac{1}{10}p\right) &= 0 \\ -p + 9,9\left(1 - \frac{1}{10}p\right) &= 0 \\ 1,99p &= 9,9 \end{aligned}$$

The new market price for bread is $p = 4.97$