The following has been giving:
The demand curve for the students is giving at: $D_s(p) = max[1000-20p, 0]$ The demand curve for the employed people is giving at: $D_e(p) = max[1800-20p, 0]$. We assumes Antonio's has constant marginal cost at 10 kr per unit,$MC(d) = 10$. The aggregate demand function is computed as the following: $D_a(p) = 2800 - 40p$.

$$D_M(p) = \begin{cases} 0 & p > 1800 \\ 1800 - 20p & p \in [1000, 1800] \\ 2800 - 40p & p \in [0, 1000] \end{cases}$$

a) We find the inverse function for the three demand functions. These are computed as following:

$$P_s(d) = 50 - \frac{d}{20}$$

$$P_e(d) = 90 - \frac{d}{20}$$

$$P_a(d) = 70 - \frac{d}{40}$$

We acknowledge Antonio's monopolist status. Therefore we compute the MR function as: $MR = 70 - 2\frac{d}{40} \Leftrightarrow MR_a = 70 - \frac{d}{20}$ To find the optimal quantity produced we compute $MR_a = MC \Leftrightarrow$.

$$70 - \frac{d}{20} = 10 \Leftrightarrow$$

$$60 = \frac{d}{20} \Leftrightarrow$$

$$d^\star = 1200$$

Therefore, the optimal quantity produced is 1200 units of pizza. We find the price by inserting the quantity into the aggregate demand function:

$$P_a(1200) = 70 - \frac{1200}{40} \Leftrightarrow$$

$$P_a(1200) = 70 - 30 \Leftrightarrow$$

$$P_a(1200) = 40$$

Therefore, the optimal price is $p^\star = 40$ per unit. We now find the optimal quantity and price for the employed staff.

$$MR_e = MC \Leftrightarrow$$

$$90 - \frac{d}{10} = 10 \Leftrightarrow$$

$$80 = \frac{d}{10} \Leftrightarrow$$

$$800 = d_e^\star$$

We insert this into demand function:

$$P_e(800) = 90 - \frac{800}{20} \Leftrightarrow$$

$$P_e(800) = 50$$

Therefore, the optimal quantity $Q_e^\star = 800$ and $P_e^\star = 50$. To compute the profits we compute:$TR - TC$

$$\pi_a = 40 * 1200 - 1200 * 10 \Leftrightarrow$$

$$\pi_a = 36000$$

b) To ensure the students a place in the market we add a student discount. We start with the invers demand function for students. We disregard other firms and consolidate Antonio's monopoly. Therefore, his MR is giving at:

$$MR = 50 - \frac{2d}{20} \Leftrightarrow$$

$$MR = 50 - \frac{d}{10}$$

Therefore,

$$MR = MC \Leftrightarrow$$

$$50 - \frac{d}{10} = 10 \Leftrightarrow$$

$$40 = \frac{d}{10} \Leftrightarrow$$

$$d = 400$$

Inserting this into the demand functions gives us the optimal price for students.

$$P_s(400) = 50 - \frac{400}{20} \Leftrightarrow$$

$$P_s(400) = 50 - 30 \Leftrightarrow$$

$$P_s(400) = 30$$

Therefore, the optimal price and quantity for the students are $p^\star = 30Q^\star = 400$. Totalling this with the same for the employed individuals we have a quantity of 1200 and two different prices. To find Antonio's profits we compute.

$$\pi = TR - TC \Leftrightarrow$$

$$\pi = p_s * q_s + p_e + q_e - C(q_s + q_e) \Leftrightarrow$$

$$\pi = 30 * 400 + 50 * 800 - C(400 + 800) \Leftrightarrow$$

$$\pi = 12000 + 40000 - 12000 \Leftrightarrow$$

$$\pi = 40000$$