a) For the egg farmers $MC = MR$

but $MC = P_{egg} = MR$ (b/c competitive)

so, $MC = P_{egg}$

$$5 + P_{PS} = 100 - Q$$

$$\boxed{P_{PS} = 95 - Q}$$

derived market demand for parent stocks.

b)
$$\pi^{PS} = TR - TC$$
$$= P_{PS} \times Q - MC_{PS} \times Q$$
$$= (P_{PS} - MC_{PS})Q$$
$$= (95 - Q - 10)Q$$
$$= (85 - Q)Q = 85Q - Q^2$$

$$\frac{d\pi^{PS}}{dQ} = 0 = 85 - 2Q \Rightarrow Q = 42.5 \#$$

$$P_{PS} = 95 - Q = 52.5 \#$$

$$\pi^{PS} = (52.5 - 10)\,42.5 = 1{,}806.25 \#$$

c) For competitive egg farmers $P_{egg} = MC_{egg}$

$$P_{egg} = 5 + P_{PS}$$
$$= 5 + 52.5 = 57.5 \#$$

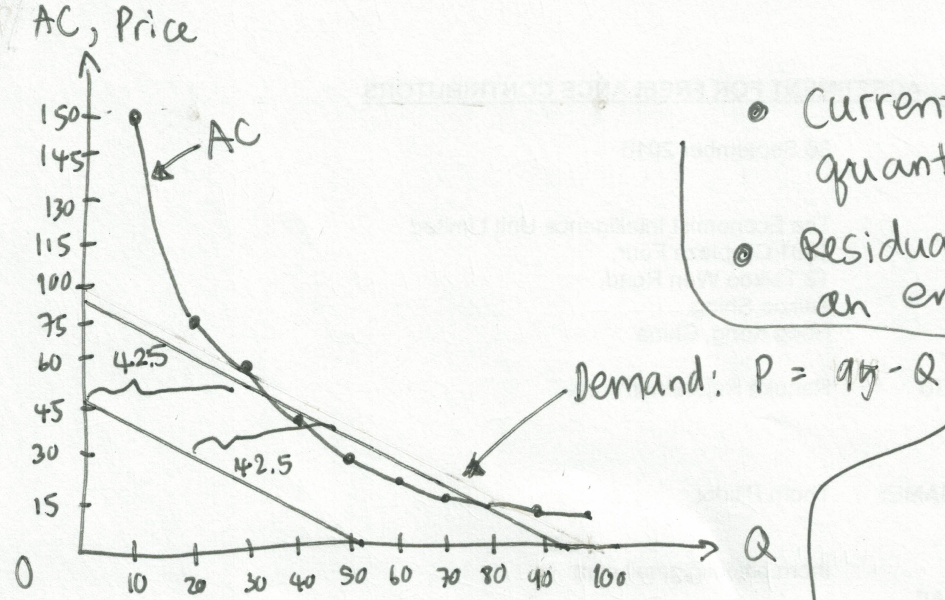
$$Q_{egg} = 100 - P_{egg} = 100 - 57.5 = 42.5 \#$$

$$\pi_{egg} = (P_{egg} - MC_{egg})Q = (57.5 - 57.5)Q = 0 \#$$

d) The parent stock importer wouldn't have any incentive to vertically integrate with an egg farmer because they already earn the maximum profit. Egg farmers have an incentive to vertical integrate as they may earn some profit share. However, the →

P.S. importer (monopoly) wouldn't want to integrate with them anyway.

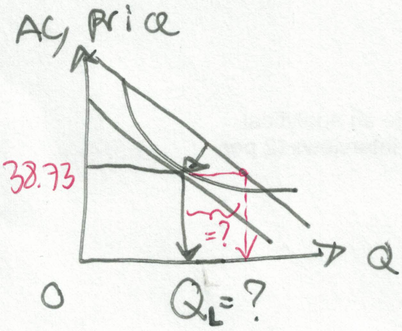
e)



- Current monopoly quantity = 42.5 units
- Residual demand for an entrant ⇒ Q − 42.5 at any given price

Since the residual demand is below the AC curve, this current monopoly quantity can deter entry.

f) Any quantity that makes the residual demand shift below the AC can deter entry



Now, find the quantity at the tangent point. This is where the slope of the AC = slope of the demand curve.

$$\frac{\partial P}{\partial Q} = \frac{\partial AC}{\partial Q}$$

$$-1 = \frac{\partial AC}{\partial Q} = -\frac{1500}{Q^2}$$

$$Q^2 = 1500$$

$$Q = \sqrt{1500}$$

$$Q_L \approx 38.73$$

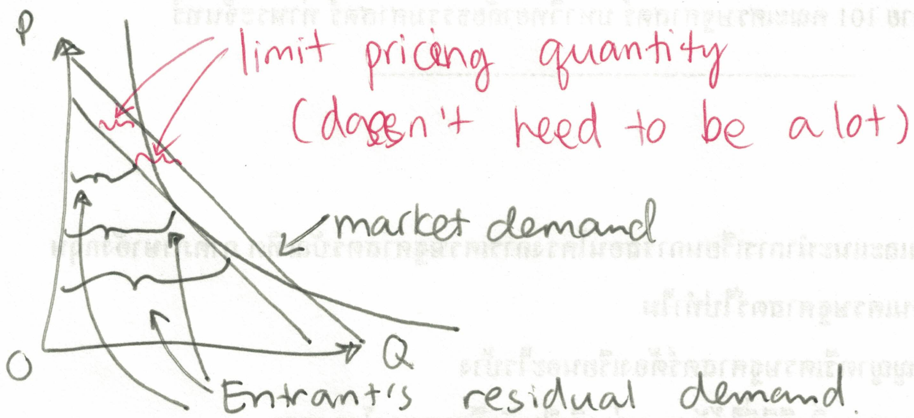
Now, @ $Q = 38.73$, AC (or P) $= \frac{1500}{38.73} = 38.73$

@ $P = 38.73$, Q on the derived demand for P.S would be $95 - 38.73 = 56.27$

So, the difference between the demand and the residual demand which tangents the AC is $56.27 - 38.73 = 17.54$.

The limit pricing quantity is then $q > 17.54$ #

g) Yes, definitely.



h) Suppose there are only 4 egg farmers playing a non-cooperative Cournot game → find the derived demand faced by the P.S. importer.

For an egg farmer they sets $MR = MC$. We know that MC of each farmer $= 5 + P_{PS}$.
Now, we need to find MR. From $MR(Q) = \frac{\partial TR(Q)}{\partial Q}$,

$$TR_i = P_{egg}\, q_i \quad \text{for firm } i$$

$$TR_i = (100 - Q)\, q_i$$

$$= (100 - (q_i + 3q_{\neq i}))\, q_i$$

$$= 100q_i - q_i^2 - 3q_{\neq i}\, q_i$$

$$MR_i = \frac{dTR_i}{dq_i} = 100 - 2q_i - 3q_{\neq i}$$

By symmetry, $q_i = q_{\neq i}$ in equilibrium. So,

$$MR_i = 100 - 5q_i$$

To find firm i's demand for Parent Stocks, we know that they would set $MR_i = MC$.
Therefore,

$$MR_i = 100 - 5q_i = \underbrace{5 + P_{P.S.}}_{MC}$$

$$\boxed{P_{P.S} = 95 - 5q_i}$$ ← This is firm i's demand for P.S.

Since there are 4 firms (egg farmers), we add this demand up 4 times.

$$P_{P.S} = 95 - 5q_i$$

$$q_i = \frac{95 - P_{P.S.}}{5}$$

$$Q = 4 \times q_i = \frac{4(95 - P_{P.S})}{5}$$

Now, rearrange the demand as a function of Q

$$\frac{5}{4}Q = 95 - P_{P.S.}$$

$$\boxed{P_{P.S.} = 95 - \frac{5Q}{4}} \#$$ ← This is the demand for P.S. faced by the P.S. producer.