

- Homework
- market demand $p = 10 - Q$
 - marginal cost of upstream $MC_u = m = 2$
 - downstream firm has no additional MC other than intermediate input price charged by upstream firm

① calculate $P_D^*, P_U^*, Q_D^*, Q_U^*, \pi_D^*, \pi_U^*$

soln since demand upstream = downstream

$$\begin{array}{l|l} TR = (10 - Q)Q & MR = \frac{dTR}{dQ} \\ TR = 10Q - Q^2 & MR = 10 - 2Q \end{array}$$

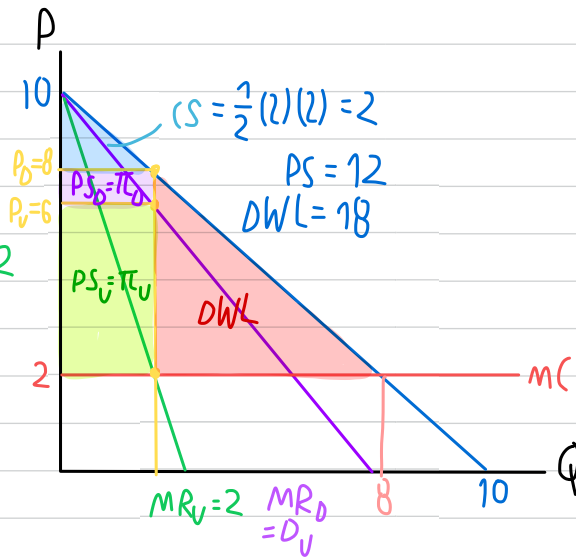
$$\therefore \text{demand upstream} = 10 - 2Q = 6$$

$$\begin{array}{l|l} TR_U = (10 - 2Q)Q & MR_U = \frac{dTR_U}{dQ} \\ TR_U = 10Q - 2Q^2 & MR_U = 10 - 4Q = 2 \end{array}$$

Upstream monopoly maximize profit π :

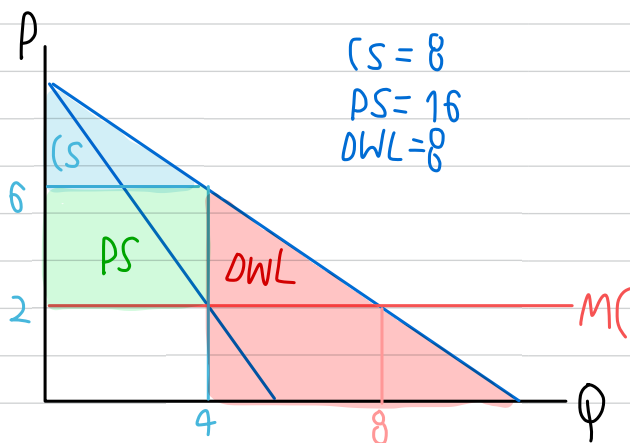
$$\begin{aligned} MR_U &= MC_U \\ 10 - 4Q &= 2 \\ 4Q &= 8 \rightarrow Q^* = 2 \end{aligned}$$

$$\begin{aligned} \therefore P_U^* &= 10 - 2(2) = 6, Q_U^* = 2, \pi_U^* = 8 \\ P_D^* &= 10 - 2 = 8, Q_D^* = 2, \pi_D^* = 4 \end{aligned}$$



② if two firms merge to form a single monopolist,
calculate p^* , Q^* , π^*

$$\begin{aligned} MR &= MC \\ 10 - 2Q &= 2 \\ 2Q &= 8 \rightarrow Q^* = 4 \\ \therefore P_M^* &= 10 - 4 = 6 \\ \pi_M^* &= 5(4) - 2(4) = 16 \end{aligned}$$



③ compare welfare of consumers and producers

In this case, merging of 2 firms can improve welfare since deadweight loss decrease after merging.