## Upstream

$MC = 2$

Find MR

$P = 10 - 2Q$

$TR = (10 - 2Q)Q$

$TR = 10Q - 2Q^2$

$MR = 10 - 4Q$

Find $P_U^*$ and $Q_U^*$

$MR = MC$

$10 - 4Q = 2$

$8 = 4Q$

$Q = 2$

sub $Q = 2$ in $P = 10 - 2Q$

$P = 10 - 2(2)$

$P = 6$

## Downstream

$MR = 10 - 4Q$ $\quad MC = P_U^* = 6$

$MR = MC$

$10 - 4Q = 6$

$4 = 4Q$

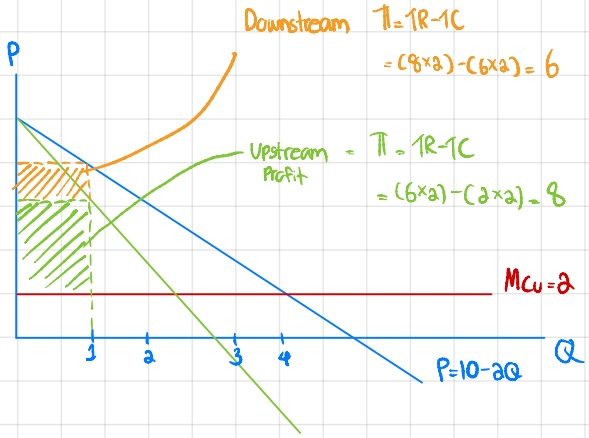
$Q = 1$

sub $Q = 1$ in $P = 10 - 2Q$

$P = 10 - 2$

$= 8$

## Case 2 firm




Downstream $\Pi = TR - TC$

$= (8 \times 2) - (6 \times 2) = 6$

Upstream $\Pi = TR - TC$

$= (6 \times 2) - (2 \times 2) = 8$

∴ If there are 2 firm

$P_U^* = 6$, $Q_U^* = 2$, $P_D^* = 8$, $Q_D^* = 1$

$\Pi_U^* = 8$, $\Pi_D^* = 6$

## Case merge firm

$MR = MC$

$10 - 4Q = 2$

$8 = 4Q$

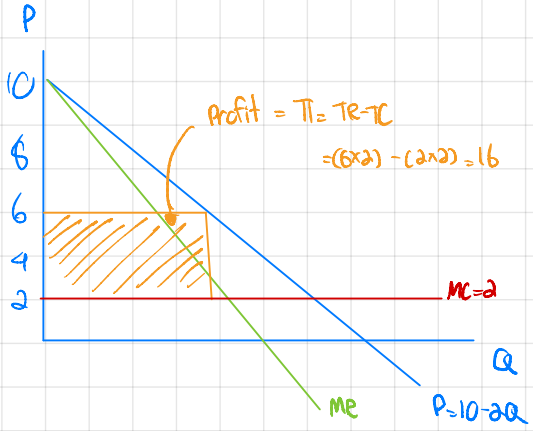
$Q = 4$

sub $Q = 2$ in $P = 10 - 2Q$

$P = 10 - 2(2)$

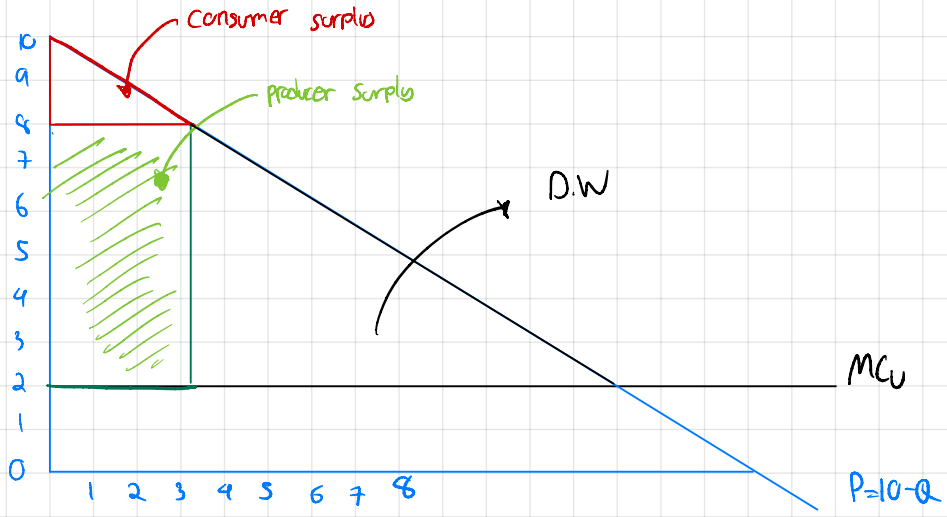
$P = 6$

∴ If merge firm $P^* = 6$, $Q^* = 2$, $\Pi^* = 8$

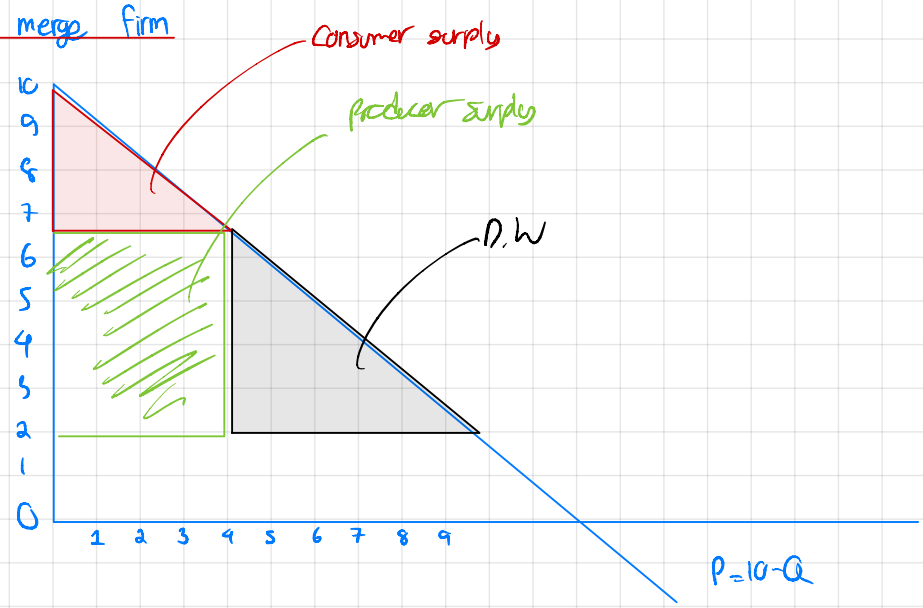


# Welfare

## Case a firm




## Case merge firm




∴ As the firm merge both consumer and producer will have a gain in the economic welfare as the size of dead weight loss get decrease.