H.W.

market demand
$P = 10 - Q$

MC up stream
$MC_{up} = 2$

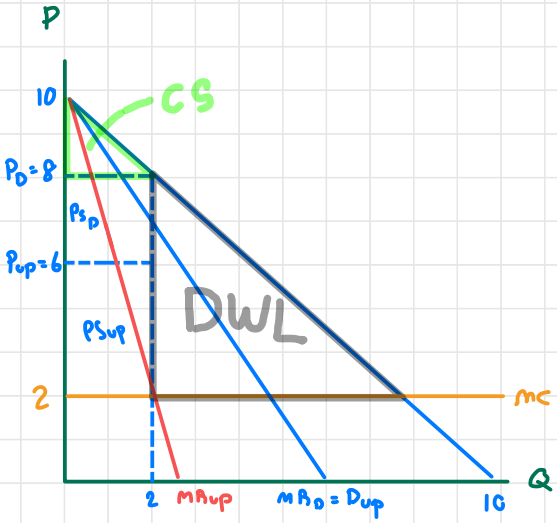
$TR = (10-Q)Q = 10Q - Q^2$

$MR = \frac{dTR}{dQ} = 10 - 2Q$

Demand upstream; $P_{up} = 10 - 2Q$

$TR_{up} = (10-2Q)Q$
$= 10Q - 2Q^2$

$MR = \frac{dTR_{up}}{dQ} = 10 - 4Q$



upstream monopoly max π

$MR_{up} = MC_{up}$
$10 - 4Q = 2$
$4Q = 8$
$Q = 2$

∴ Supstitute $Q=2$ in demand upstream; $P_{up} = 10 - 2(2) = 6$
Supstitute $Q=2$ in market demand; $P = 10 - 2 = 8$

$CS = \frac{1}{2} \cdot 2 \cdot 2 = 2$ $\quad$ $DWL = \frac{1}{2} \cdot 6 \cdot 6 = 18$

$PS_D = 4$
$PS_{up} = 8$
} total PS = 12

$\pi_{up} = TR_{up} - TC_{up} = 6(2) - 2(2) = 8$

$\pi_D = TR_D - TC_D = 8(2) - 6(2) = 4$

Total $\pi = 8 + 4 = 12$

In the case that 2 firms merge (monopoly case)

Ex// Market demand ; $P = 10 - Q$

$MC = MC_{up} = 2$

$MR = 10 - 2Q = MC = 2$

$10 - 2Q = 2$

$2Q = 8$

$Q = 4$

$Q_M = 4$

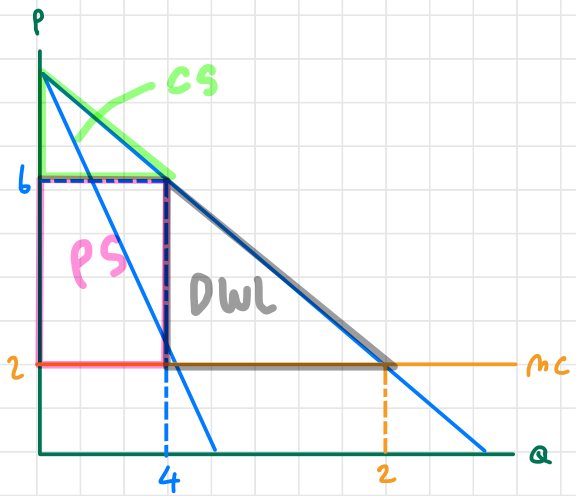
$P_M = 10 - 4 = 6$

$\pi_M = 6(4) - 2(4) = 16$

$CS = \frac{1}{2} \cdot 4 \cdot 4 = 8$

$PS_M = 16$

$DWL = \frac{1}{2} \cdot 4 \cdot 4 = 8$



∴ Profit for monopoly case will be higher. Also the welfare of consumer and producer as well.

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