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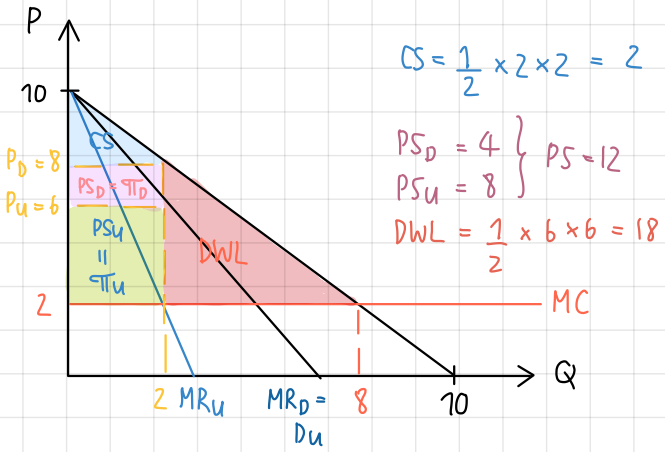
Ex. Market Demand : $D = 10 - Q$
MC upstream : $MC_u = 2$

$TR = (10-Q)Q = 10Q - Q^2$
$MR = \frac{dTR}{dQ} = 10 - 2Q$

$\therefore$ Demand upsteam : $D_u = 10 - 2Q$

$TR_u = (10-2Q)Q = 10Q - 2Q^2$
$MR = \frac{dTR_u}{dQ} = 10 - 4Q$

Upsteam Monopoly Max π
$MR_u = MC_u$
$10 - 4Q = 2$
$4Q = 8$
$Q_u = 2$
$P_u = 10 - 2(2) = 6$
$P_D = 10 - (2) = 8$



$CS = \frac{1}{2} \times 2 \times 2 = 2$

$PS_D = 4$
$PS_u = 8$
$PS = 12$

$DWL = \frac{1}{2} \times 6 \times 6 = 18$

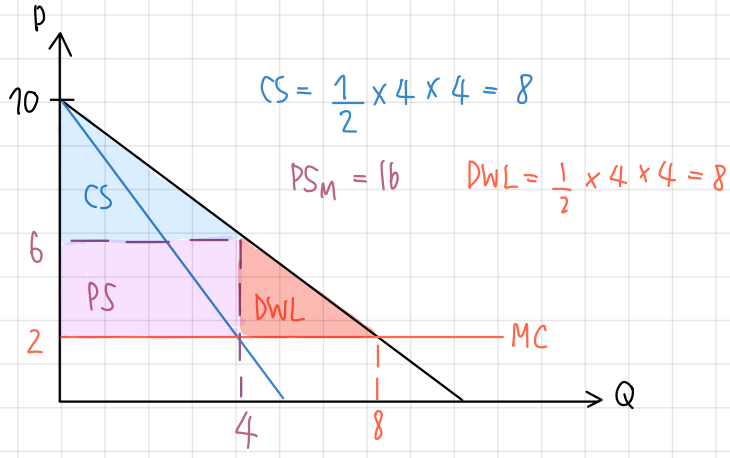
$\pi_u = TR_u - TC_u = 6(2) - 2(2) = 8$

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

Ans. : $\pi_{total} = 8 + 4 = 12$

Ex. Market Demand : $D = 10 - Q$
MC : $MC_u = 2$

$\therefore MR = 10 - 2Q = MC = 2$
$10 - 2Q = 2$
$2Q = 8$
$Q_M = 4$
$P_M = 10 - 4 = 6$
$\pi_M = 6(4) - 2(4) = 16$



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

$PS_M = 16$

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