ASSIGNMENT

Suppose a profit-maximising monopolist producing Q units of output faces the demand curve $P = 20 - Q$. Its total cost when producing Q units of output is $TC = 24 + Q^2$. The FC is sunk and the $MC = 2Q$.

a. Suppose price discrimination is impossible. How large will the profit be? How large is the producer surplus?
b. Suppose the firm can engage in perfect 1st degree price discrimination. How large will the profit be? How large is the producer surplus?
c. How much extra surplus does the producer capture when it can engage in 1st degree price discrimination instead of charging a uniform price.

Solution:

a.

$MC = MR$

$20 - 2Q = 2Q$

$Q_e = 5$

$P_e = 20 - 5 = 15$

$TR = P \times Q = 5 \times 15 = 75$

$TC = 24 + 5^2 = 24 + 25 = 49$

$\pi = TR - TC = 75 - 49 = 26$

Producer surplus is just TR non-sunk cost or in this case TR – VC.

Producer surplus = 75 - $Q^2 = 75 - 5^2 = 50$

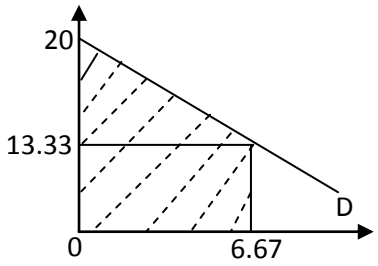
b. With perfect 1st degree price discrimination firm sets P = MC to determine the level of output.

$20 - Q = 2Q$

$Q_{ne} = 6.67$

$P_{ne} = 20 - 6.67 = 13.33$

$TR = \frac{1}{2}bh + (P \times Q) = \frac{1}{2}(20 - 13.33)6.67 + (13.33 \times 6.67) = 111.16$



$TC = 24 + Q^2 = 24 + 6.67^2 = 68.49$

$\pi = TR - TC = 111.16 - 68.49 = 42.67$

Producer surplus = TR - VC = 111.16 - $6.67^2 = 66.67$

c. By being able to employ perfect 1st degree price discrimination, the firm increase profit and producer surplus by 16.67.