

Definite Integral

For calculating consumer surplus
(CS) and producer's surplus
(PS).

CS = willingness to pay
- Actual payment

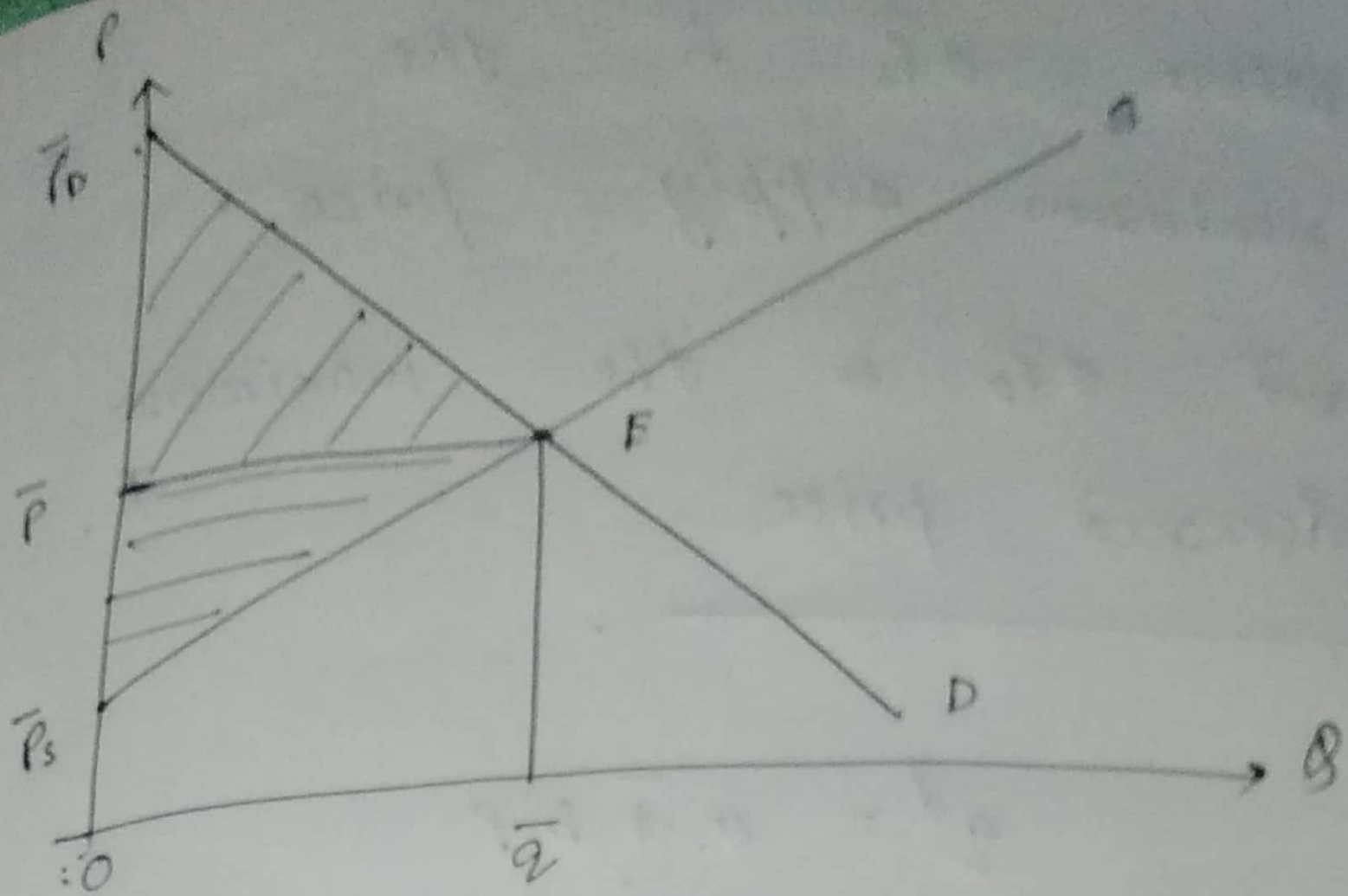
$$CS = \int_0^{\bar{q}} p^d \cdot dq - \bar{p} \cdot \bar{q}$$

where p^d is the inverse
demand function

PS = Actual revenue earned
- willingness to sell

$$PS = \bar{p} \cdot \bar{q} - \int_0^{\bar{q}} p^s \cdot dq$$

p^s is the inverse supply function



Now, CS = area of the triangle $\Delta P E \bar{P}_D$

$$= \frac{1}{2} \times \text{base} \times \text{height}$$

$$= \frac{1}{2} \times \bar{P} E \times \bar{P} \bar{P}_D$$

PS = area of the triangle

$$\Delta P E \bar{P}_S$$

$$= \frac{1}{2} \times \bar{P} E \times \bar{P} \bar{P}_S$$

Where, $\bar{P}_S \bar{P} = O \bar{P} - O \bar{P}_S$

$$\bar{P} \bar{P}_D = O \bar{P}_D - O \bar{P}$$

where, \bar{p}_s is the
minimum supply price

and \bar{p}_d is the maximum
demand price

$$q^d = a - bP$$

$$f'(P) < 0$$

$$\Rightarrow P^d = \frac{a - q}{b}$$

$$q^s = f(P)$$

$$f'(P) > 0$$

Inverse demand function

$$e_p = \frac{5q}{(q+3)(q-2)}$$