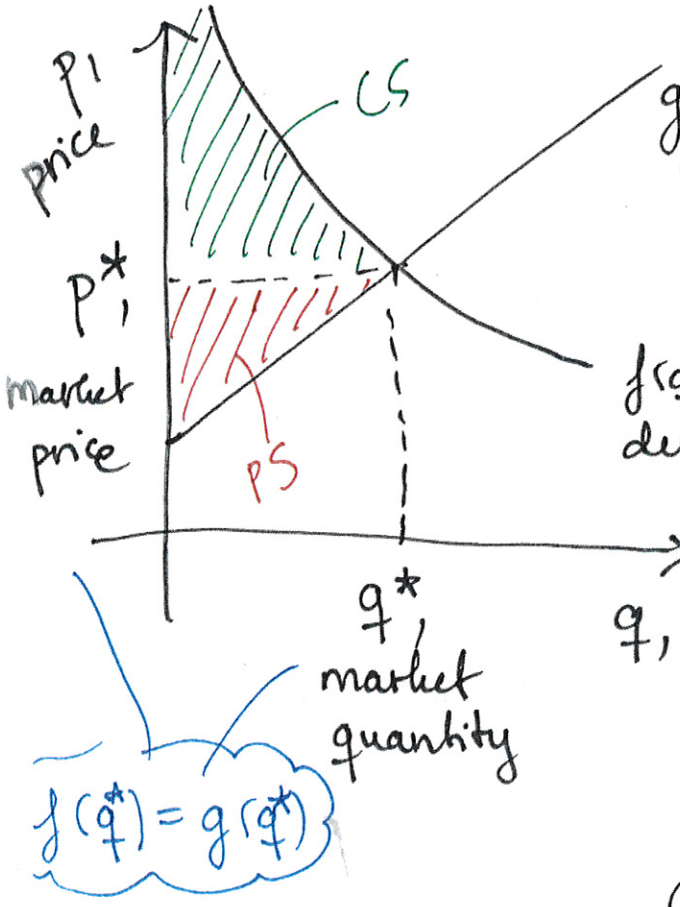
Consumer / producer surplus

CS PS



- $p = f(q)$, demand function (inverse)
- $p = g(q)$, supply function (inverse)

CS: Consumer surplus

$$CS = \int_0^{q^*} f(q) - p^* \, dq$$

PS: Producer surplus

$$PS = \int_0^{q^*} p^* - g(q) \, dq$$

Ex: $f(q) = \frac{100}{q+5}$, $g(q) = q+5$

What is the market price/quantity?

$f(q) = g(q)$ "demand = supply"

$$\frac{100}{q+5} = q+5$$

$$100 = (q+5)^2$$

$$q+5 = \pm\sqrt{100} = \pm 10 = 10$$

quantity can't be negative

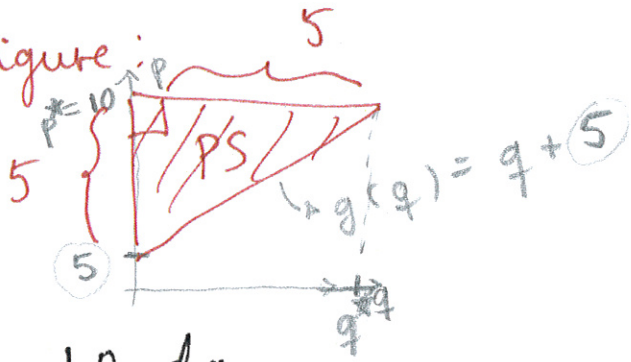
$$q = 10-5 = 5$$

$$\underline{q^* = 5}$$

$$p^* = q^* + 5 = 5+5 = \underline{10}$$

$$PS = \int_0^5 10 - (q+5)\,dq = \ldots = 12{,}5$$

OR: Area of triangle in figure:



CS:

$$CS = \int_0^5 \frac{100}{q-5} - 10\,dq$$

$$= \ldots = 100\ln 2 - 50$$