calculate inverse demand (15)

(10) $D(P) = \frac{6000}{P} - 50 = Q^D \rightarrow D(Q) : \frac{6000}{P} = Q + 50$

$\Rightarrow 6000 = P(Q+50)$

$\boxed{\frac{6000}{Q+50} = P = D(Q)}$

$S(P) = P - 10 = Q^S$

$\rightarrow \boxed{P = Q + 10 \Rightarrow \text{Inverse Supply}}$

- Note that eq. happens when $Q^D = Q^S$. Hence,

$$\frac{6000}{P} - 50 = P - 10$$

Isolate $\frac{6000}{P}$ in LHS $\Rightarrow \frac{6000}{P} = P + 40$

Isolate P in RHS $\Rightarrow 6000 = (P+40)P$

Expand RHS $\Rightarrow 6000 = P^2 + 40P$

write Quadratic eq. $\Rightarrow 0 = P^2 + 40P - 6000$

Solve Quadratic eq. $\Rightarrow x = \frac{-40 \pm \sqrt{(40)^2 - (4)(1)(-6000)}}{2(1)}$

$$\Rightarrow x = \frac{-40 \pm \sqrt{1600 + 24000}}{2}$$

$$\Rightarrow x = \frac{-40 \pm \sqrt{25600}}{2}$$

$$\Rightarrow x = \frac{-40 \pm 160}{2} \Rightarrow x = \begin{cases} \frac{-200}{2} = -100 \\ \frac{120}{2} = 60 \end{cases}$$

- As Price can only be positive, $\boxed{P^* = 60}$

- Now, solve for eq. Q^*:

$$Q^{S*} = P^* - 10 \Rightarrow Q^* = 60 - 10 = \boxed{50 = Q^*}$$

Hence, eq. is defined by $P = 60$, $Q = 50$.