

22. Incorrect. The answer is false not true. Market price and quantity are correct, but optimal price and quantity are incorrect. Optimal social price and quantity should be $Q = 3.32$, and $P = 1.34$.

$$Q_s = -5 + 8P \Rightarrow \text{inverse supply function } P = 0.625 + 0.125Q$$

$$Q_d = 6 - 2P \Rightarrow \text{inverse demand function } P = 3 - 0.5Q$$

Market price and quantity will be determined after setting the inverse supply function equal to the inverse demand function

$$P = 0.625 + 0.125Q$$

$$P = 3 - 0.5Q$$

Then solve for Q and P

$$0.625 + 0.125Q = 3 - 0.5Q$$

$$-2.375 = -.625Q$$

$$Q = 3.8$$

$$P = 1.1$$

Socially optimal price and quantity are determined by adding the external cost of 0.30 from the inverse supply function, so that:

$$P = 0.625 + 0.125Q + 0.30$$

$$P = 0.925 - 0.125Q$$

Set demand equal to supply:

$$0.925 + 0.125Q = 3 - 0.5Q$$

$$0.925 + 0.125Q = 3 - 0.5Q$$

$$Q = 3.32$$

At this quantity, price must be high enough to cover private costs:

$$P = 0.925 + 0.125 \cdot 3.32$$

$$P = 1.34$$