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Exercises

MARKET REGULATION (2)

Free market equilibrium and external benefit

Consider a perfectly competitive market for a normal good where the demand for the good at each price p is equal to $Q^D = 40 - 2p$ and the supply is equal to $Q^S = p/2$

Find the equilibrium quantity and price

Suppose that every unit bought generates over its lifetime external benefits of 5, which are not taken into account by buyers (e.g., the good is a tree)

Find the socially optimal quantity

Free market equilibrium and external benefit

Private demand: $Q_D = 40 - 2p$

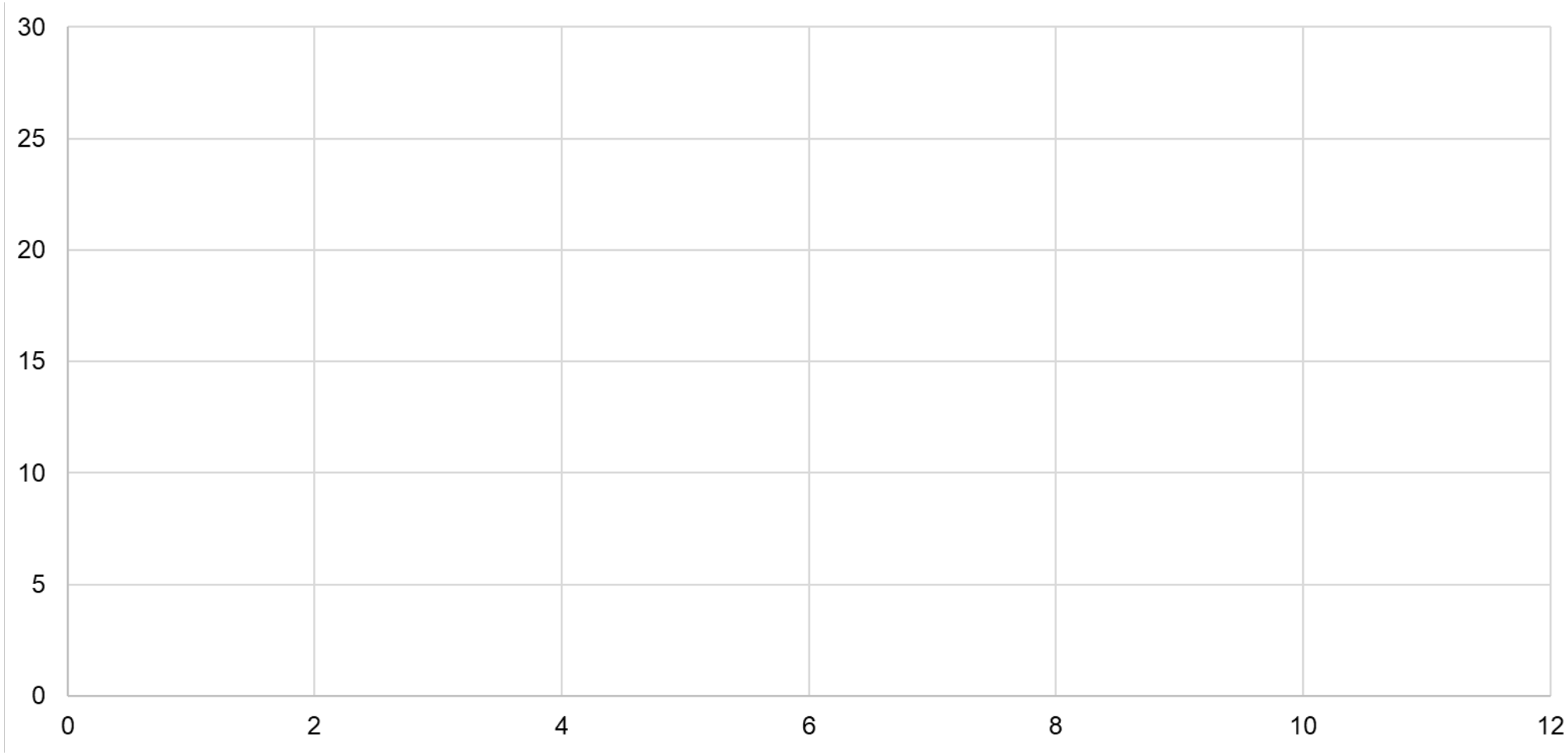
Social demand:

Supply: $Q_S = p/2$

Private mWTP:

Social mWTP:

mWTA:

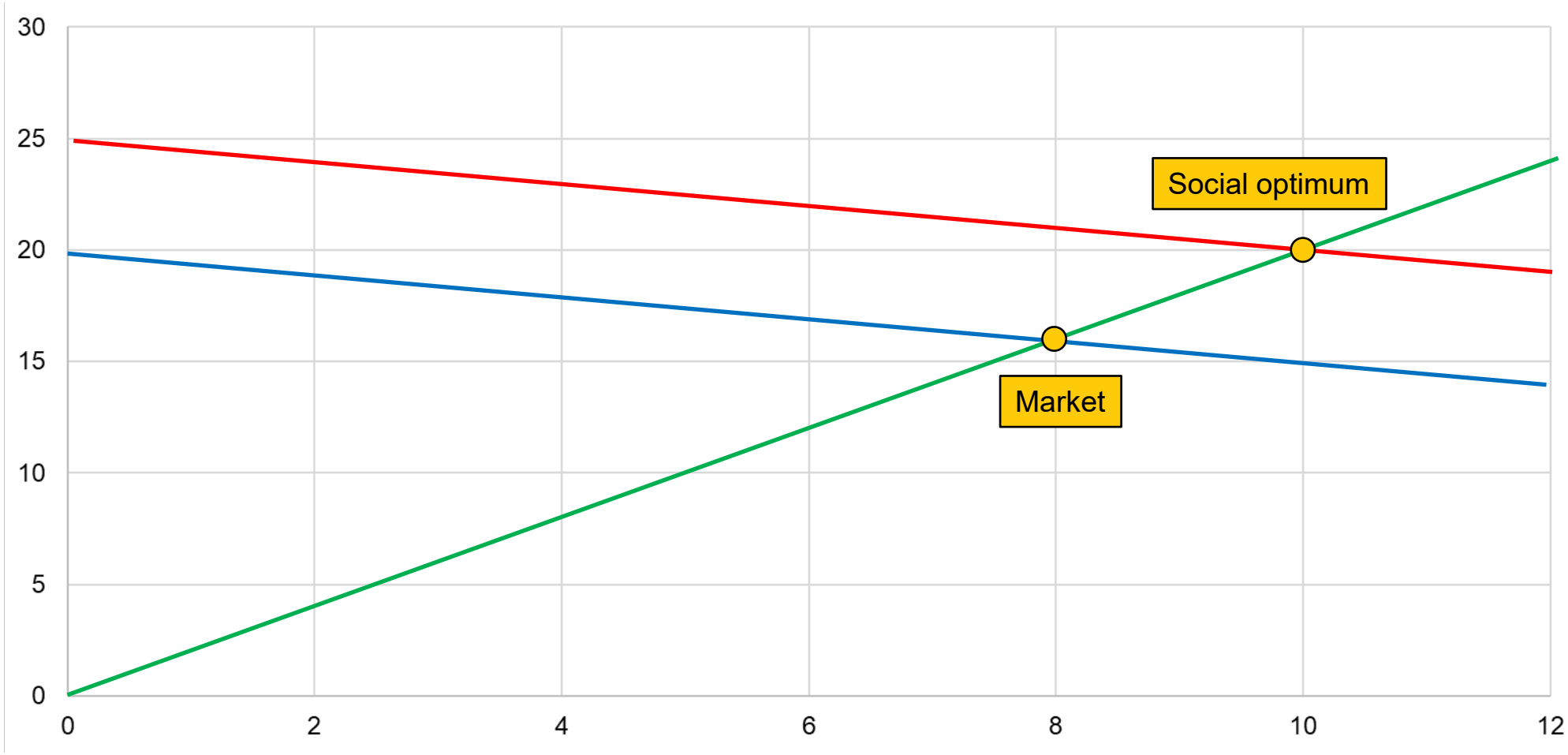


Free market equilibrium and external benefit
Answers

Private demand: $Q_D = 40 - 2p$ Private mWTP: $mWTP = 20 - Q/2$

Social demand: $Q_D^* = 50 - 2p$ Social mWTP: $mWTP^* = 25 - Q/2$

Supply: $Q_S = p/2$ mWTA: $mWTA = 2Q$



Internalisation through subsidy to buyers

The authorities internalize the external benefit by paying buyers a subsidy of 5 for every unit of the good that they buy

- Show that this leads to a market equilibrium corresponding to the social optimum
- Discuss the extent to which buyers benefit (or not) from the subsidy
- Compute the buyers' surplus without and with subsidy
- Compute the sellers' surplus without and with subsidy
- Compute the surplus for the beneficiaries of the external benefit ('third parties'), assuming that they also pay for the subsidies
- Check how total surplus changes and how this is shared among the parties

Internalisation through subsidy to buyers Answers

- Private mWTP with subsidy = 20 – Q/2 + 5 = 25 – Q/2 → Demand with subsidy = 50 – 2p
- New market equilibrium: 50 – 2p = p/2 -> p_{Ms} = 20, Q_{Ms} = 10
- As the price increases from 16 to 20, it is really the sellers who benefit from the subsidy of 5

SURPLUSES	Buyers	Sellers	Third parties
Without subsidy	(20-16)×8/2 = 16	16×8/2 = 64	5×8 = 40
With subsidy	(25-20)×10/2 = 25	20×10/2 = 100	5×10 − 5×10 = 0
Variation	+9	+36	−40

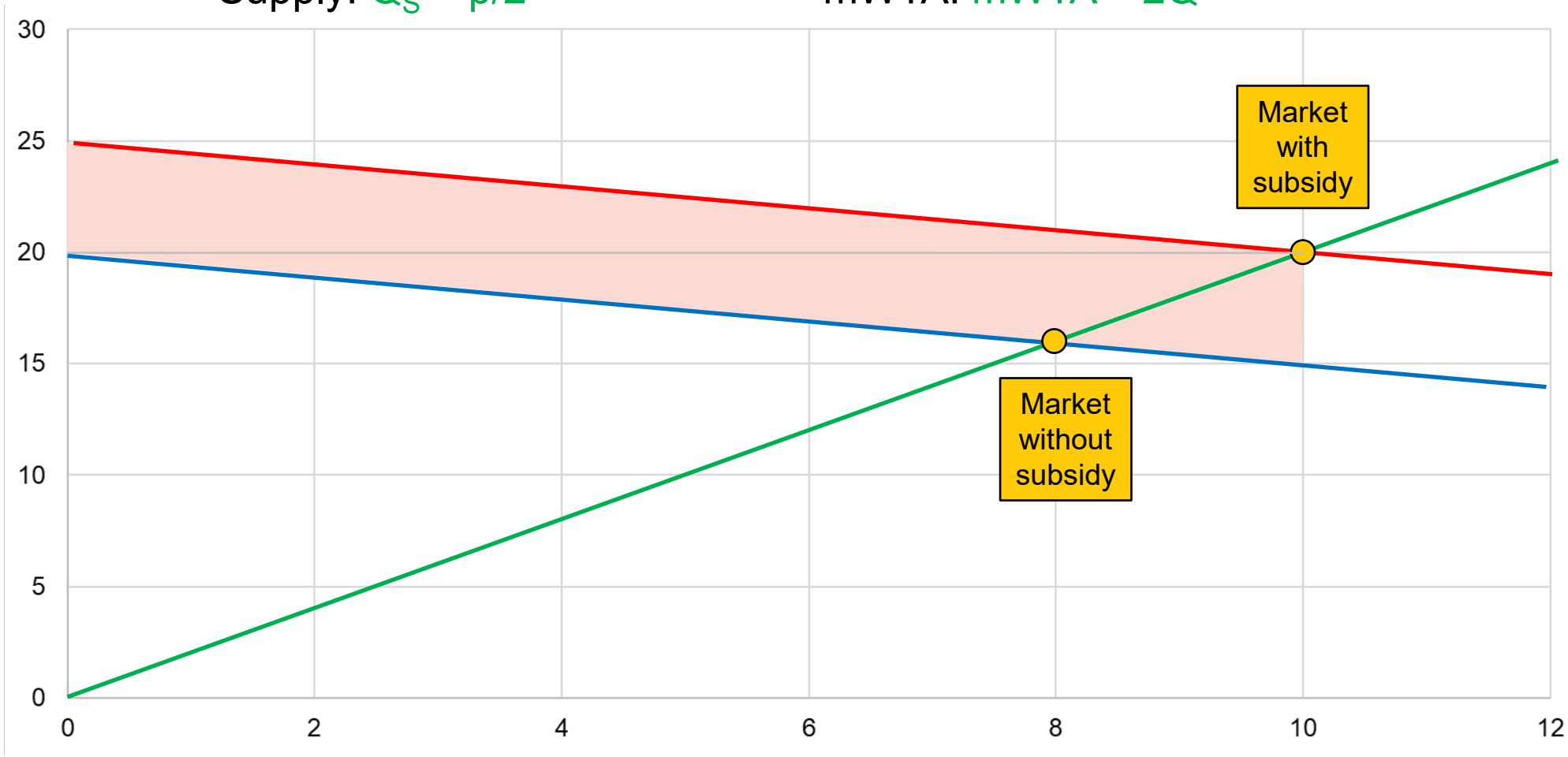
- Total subsidy payment = 10×5 offsets the benefit to third parties
- The 50 subsidy payment made total surplus increase by 5: sellers got 36, buyers 9 and third parties lost the 'free' external benefit of 40

Internalisation through subsidy to buyers
Answers

Private demand: $Q_D = 40 - 2p$ Private mWTP: $mWTP = 20 - Q/2$

Social demand: $Q_D^* = 50 - 2p$ Social mWTP: $mWTP^* = 25 - Q/2$

Supply: $Q_S = p/2$ mWTA: $mWTA = 2Q$



Internalisation through subsidy to sellers

The authorities internalize the external benefit by paying sellers a subsidy of 5 for every unit of the good that they sell; after all, they make the product whose use is socially beneficial

- Show that this leads to a market equilibrium corresponding to the social optimum
- Discuss the extent to which sellers benefit (or not) from the subsidy
- Compare with the case where buyers were given the subsidy
- Compute how much more money buyers are transferring to sellers when they get the subsidy compared to no subsidy, and how much more when sellers get the subsidy

Internalisation through subsidy to sellers Answers

- Private mWTA with subsidy = 2Q – 5 → Supply with subsidy = 2.5 + p/2
- New market equilibrium: 40 – 2p = 2.5 + p/2 -> p_{Ms} = 15, Q_{Ms} = 10
- The price only decreases from 16 to 15, so, it is really the sellers who benefit from the subsidy of 5

SURPLUSES	Buyers	Sellers	Third parties
Without subsidy	(20-16)×8/2 = 16	16×8/2 = 64	5×8 = 40
With subsidy	(20-15)×10/2 = 25	15×10 – 20×10/2 + 5×10 = 100	5×10 − 5×10 = 0
Variation	+9	+36	−40

- Sellers' surplus is equal to sales income minus private cost of producing 10 plus subsidy
- Total subsidy payment = 10×5 offsets the benefit to third parties
- The 50 subsidy payment made total surplus increase by 5: sellers got 36, buyers 9 and third parties lost the 'free' external benefit of 40

Internalisation through subsidy to sellers
Answers

Private demand: $Q_D = 40 - 2p$

Supply without subsidy: $Q_S = p/2$

Supply with subsidy: $Q_S = (p+5)/2$