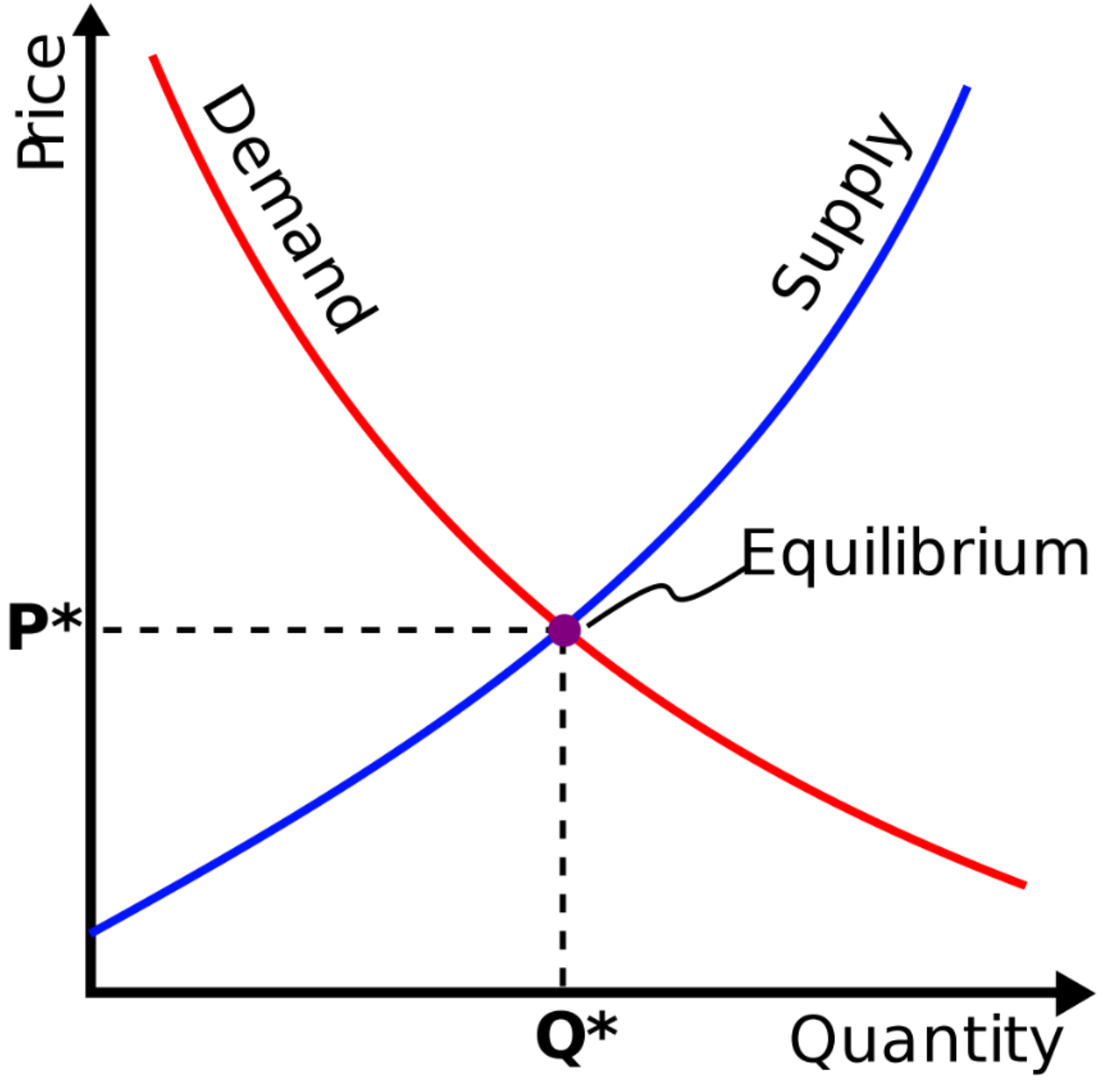
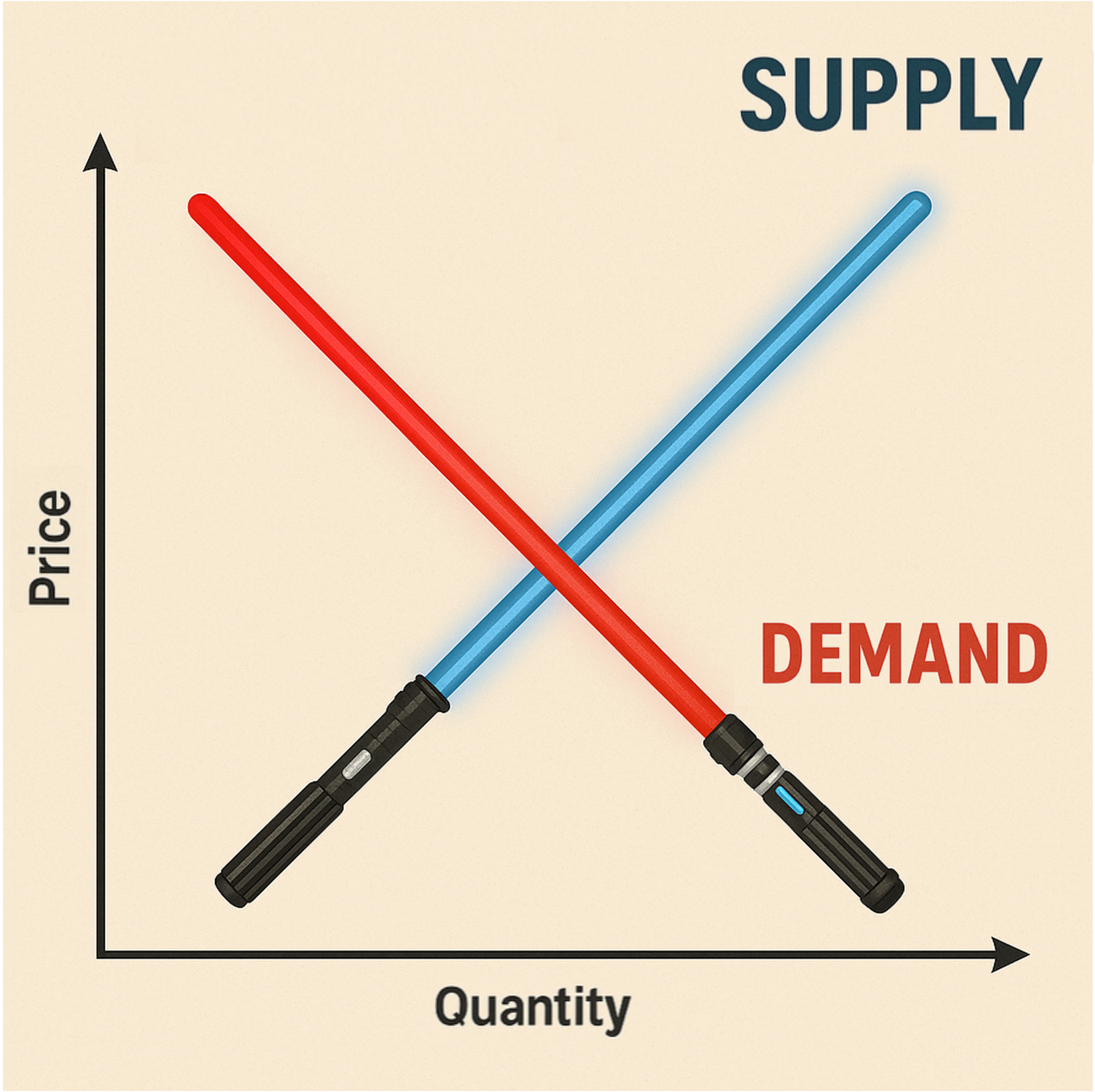
Equilibrium I:

Supply & Demand Meet

BECO-3310 Fall 2025


Price
Demand
Supply
Equilibrium
P*
Q*
Quantity


SUPPLY
DEMAND
Price
Quantity

Equilibrium

- A situation in which the market price has reached the level where quantity supplied equals quantity demanded.

$$Q_{Supplied} = Q_{Demanded}$$

Market for Granny Smith Apples

Price (dollars per pound)	Quantity of Granny Smith Apples Supplied (millions of tons)	Quantity of Granny Smith Apples Demanded (millions of tons)
$3.00	350	100
2.50	300	175
2.00	250	250
1.50	200	325
1.00	150	400
0.50	100	475

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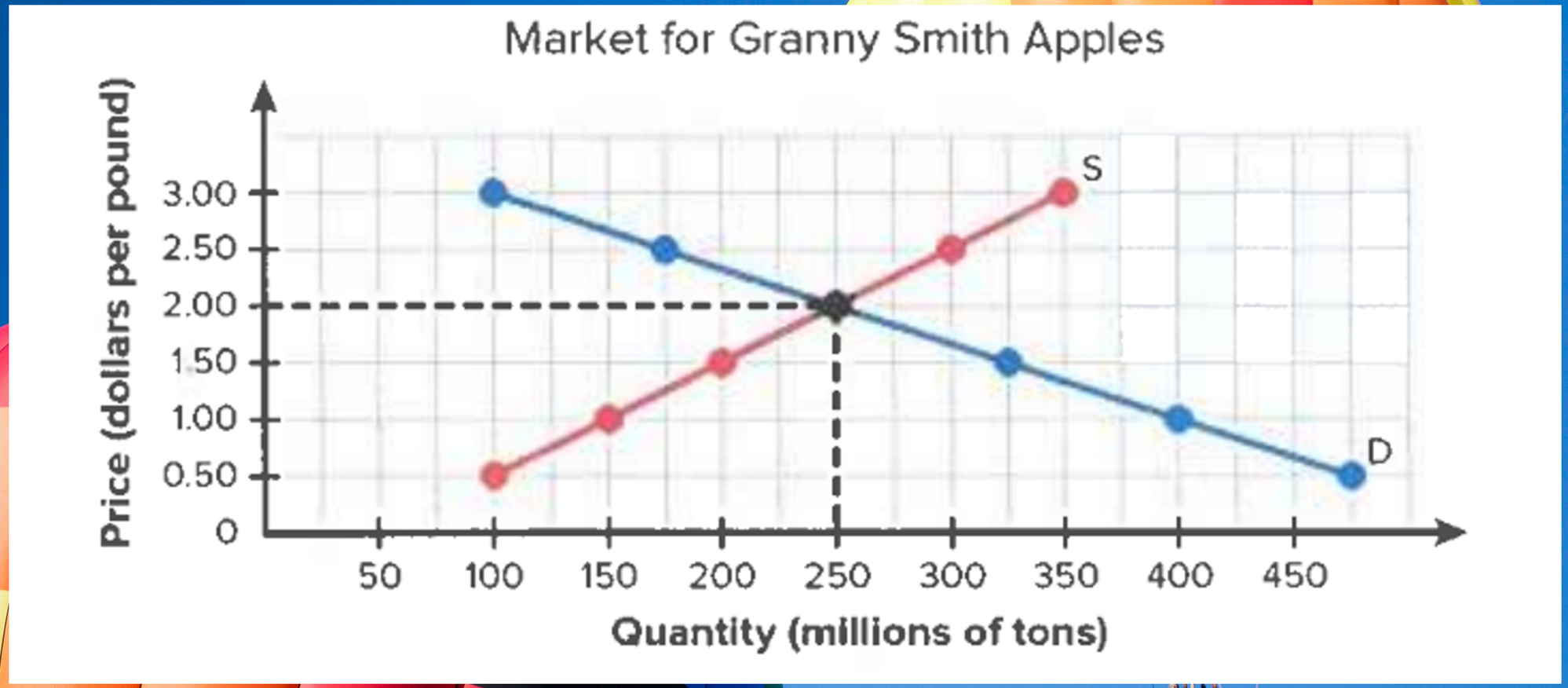
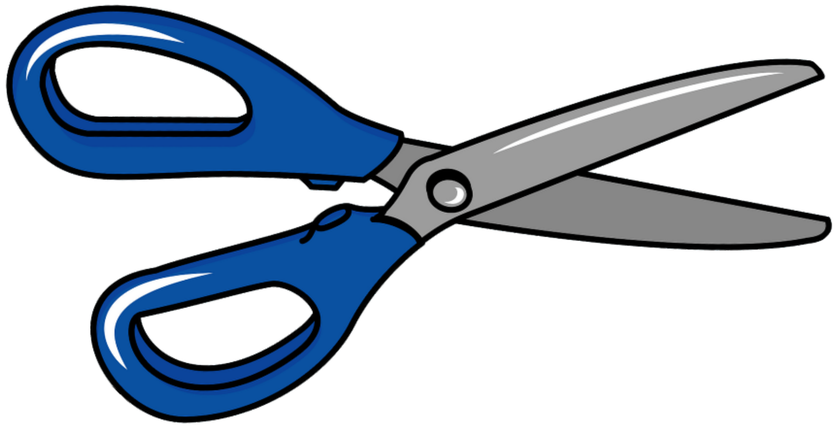

Market for Granny Smith Apples
Price (dollars per pound)
3.00
2.50
2.00
1.50
1.00
0.50
0
S
D
50
100
150
200
250
300
350
400
450
Quantity (millions of tons)

Equilibrium

- Producers & consumers interact with each other in competitive markets, balancing producer's desire for high prices & consumer's desire for low prices.



Equilibrium

- Equilibrium Price
    - The price that balances the quantity supplied & quantity demanded of a good.
    - Market-Clearing Price, P^*
- Equilibrium Quantity
    - The quantity that balances the quantity supplied & quantity demanded of a good.
    - Market-Clearing Quantity, Q^*

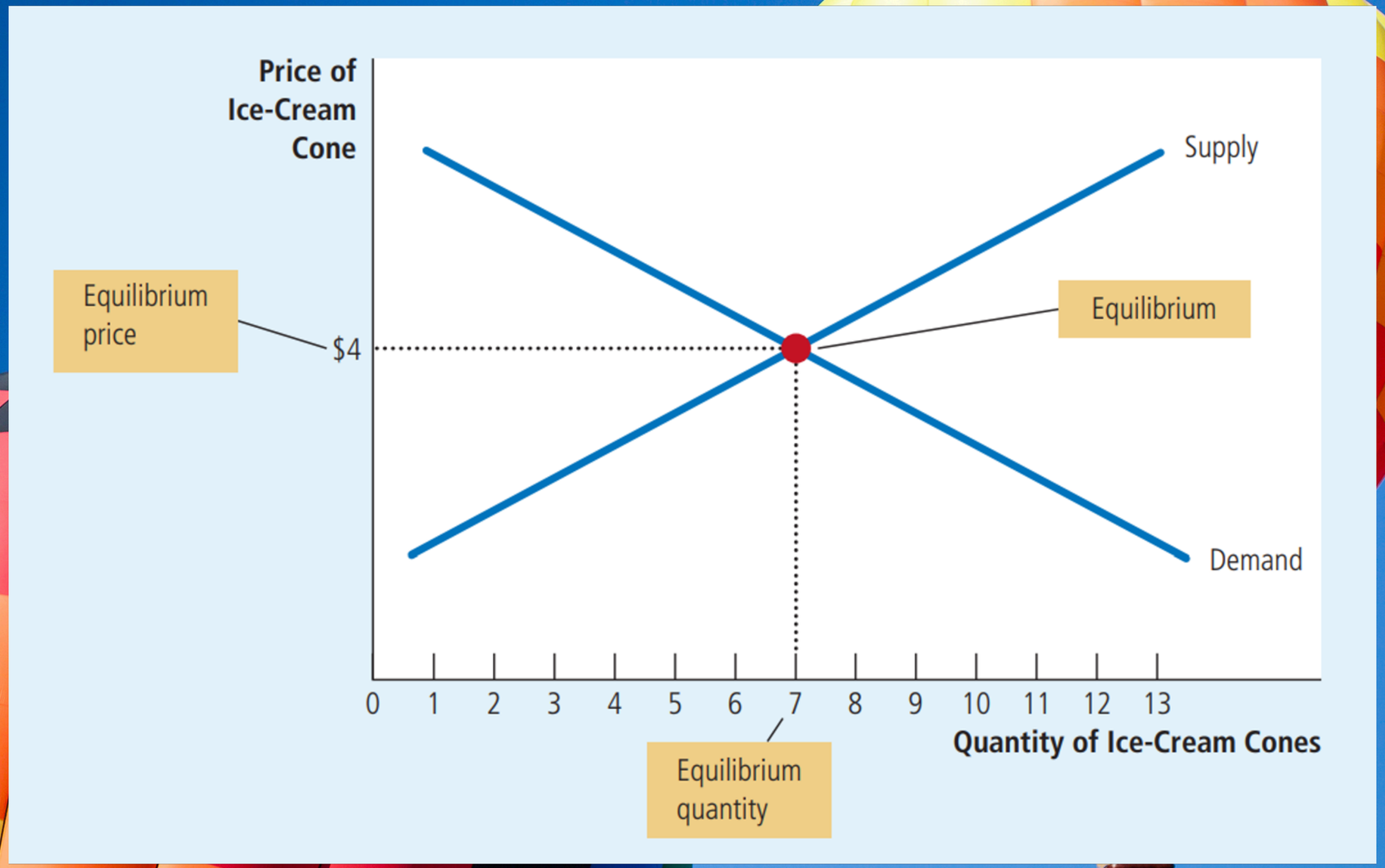
Market-Clearing Conditions

$$Q_{Supplied} = Q_{Demanded}$$

$$P^* \ \& \ Q^*$$

$$P^e \ \& \ Q^e$$

$$P^{EQ} \ \& \ Q^{EQ}$$


Price of Ice-Cream Cone
Supply
Equilibrium price
$4
Equilibrium
Demand
0 1 2 3 4 5 6 7 8 9 10 11 12 13
Quantity of Ice-Cream Cones
Equilibrium quantity

Let’s do some math.

Practice Problem 1

- Let demand be given by $P = 10 - Q$; let supply be given by $P = Q$.
- What is the equilibrium price? Quantity?

Answer

Supply: $P = Q$

Demand: $P = 10 - Q$

- In equilibrium $Q_s = Q_d$

$$Q = P \qquad Q = 10 - P$$

- Set equal:

$$P = 10 - P$$

- Solve from this equation with only one variable:

$$2P = 10$$

$$P = 5$$

- If $P = 5$, plug in:

$$Q = P = 5$$

Practice Problem 2

- Let demand be given by $P = 12 - 2Q$; let supply be given by $P = 4Q$.
- What is the equilibrium price? Quantity?

Answer

Supply: $P = 4Q$

Demand: $P = 12 - 2Q$

- In equilibrium $Q_s = Q_d$

$$Q = \frac{P}{4} \qquad Q = \frac{12-P}{2}$$

- Set equal:

$$\frac{P}{4} = \frac{12-P}{2}$$

- Solve from this equation with only one variable:

$$P = 2(12 - P)$$

$$P = 24 - 2P$$

$$3P = 24 \quad \Rightarrow \quad P = 8$$

- If $P = 8$, plug in:

$$8 = 4Q$$

$$Q = 2$$

4 Step Process for Basic Supply & Demand Equations

- Step 1: get standard S & D equations -> Q(P)
- Step 2: combine the two equations -> Q(P) supply = Q(P) demand
- Step 3: solve for the remaining variable (price)
- Step 4: plug price back into original equation to solve for quantity.

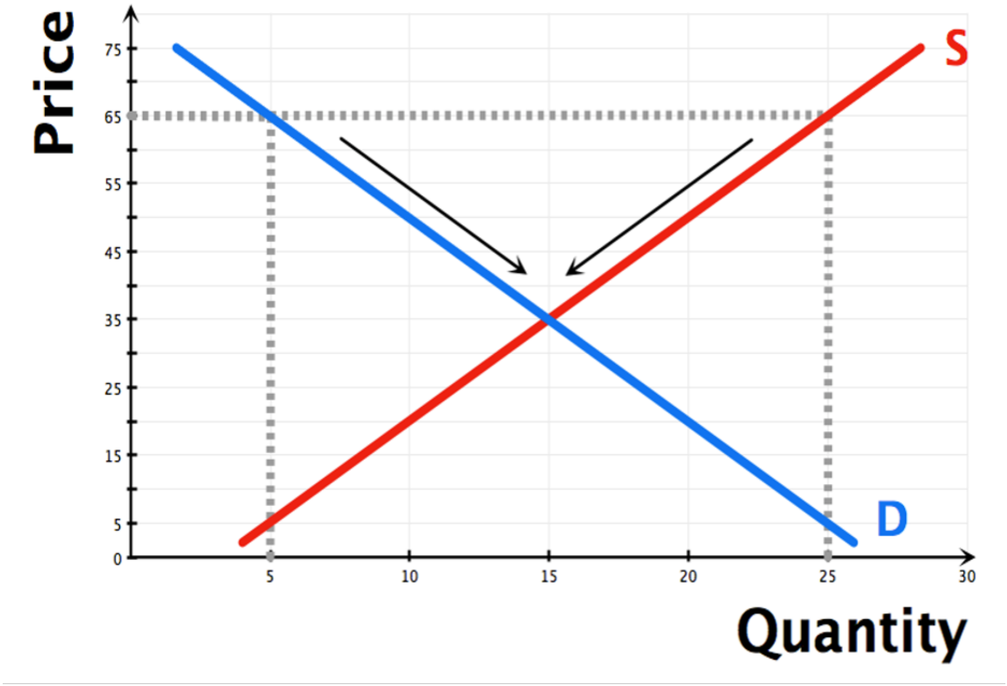
Disequilibrium

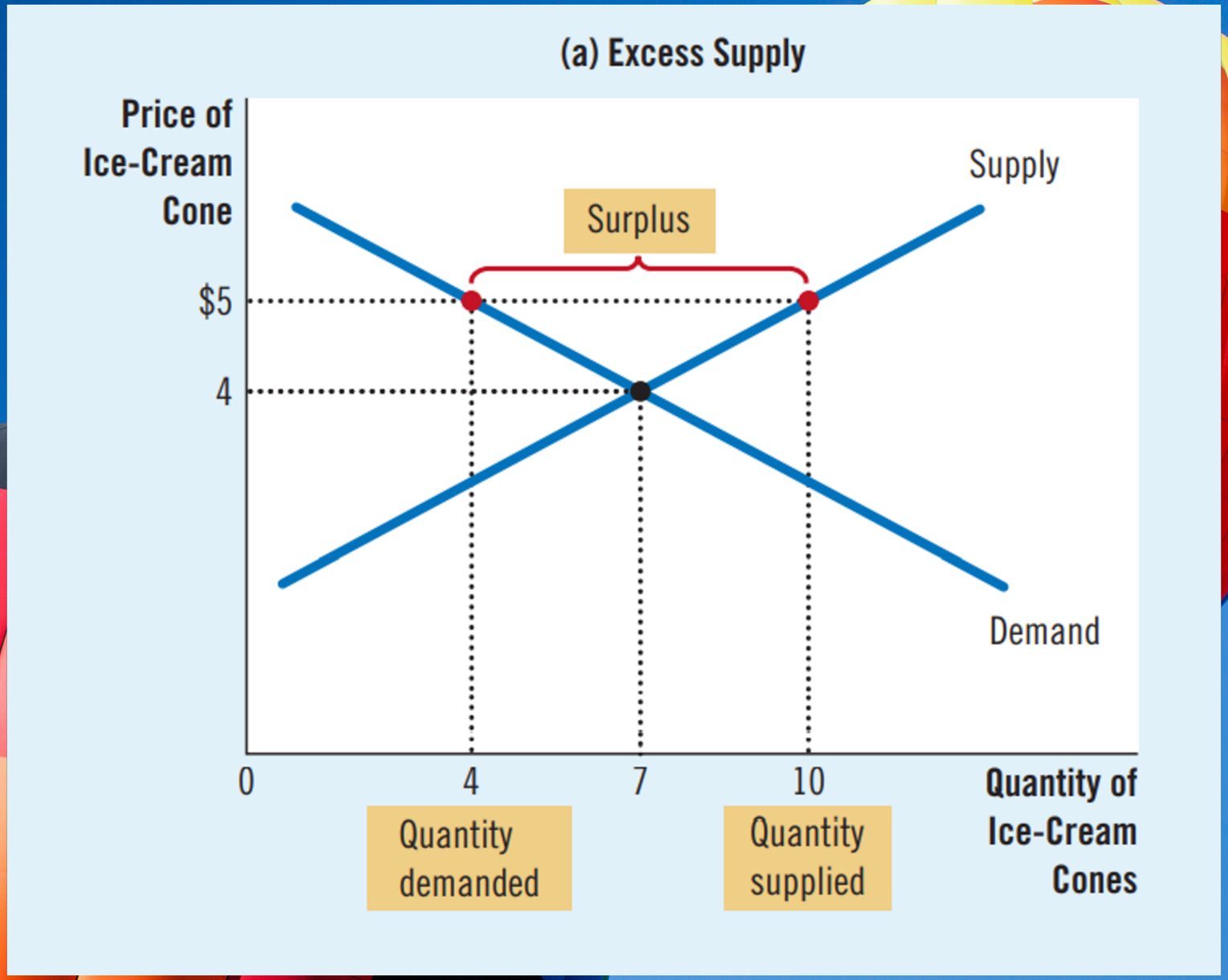
Disequilibrium

- When the price and quantity of the market do not meet market clearing conditions.
- The market is not in balance!
- Quantity Demanded ≠ Quantity Supplied

Surplus

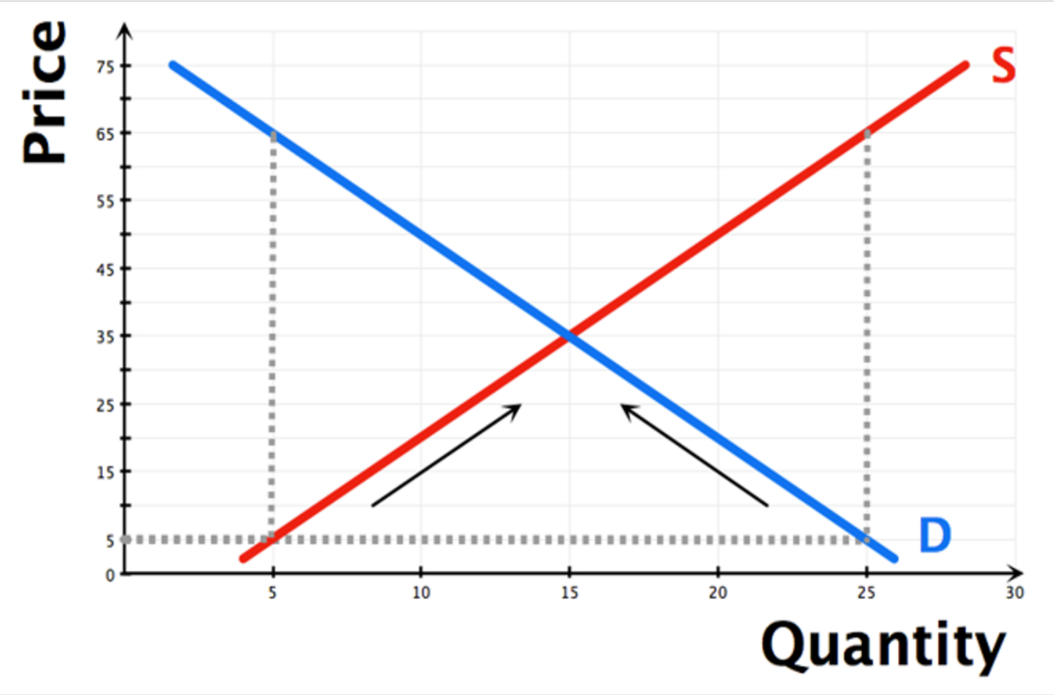
- A situation in which quantity supplied is greater than quantity demanded.
- Excess Supply
- Downward pressure on price.
    - Increase in quantity demanded.
    - Decrease in quantity supplied.

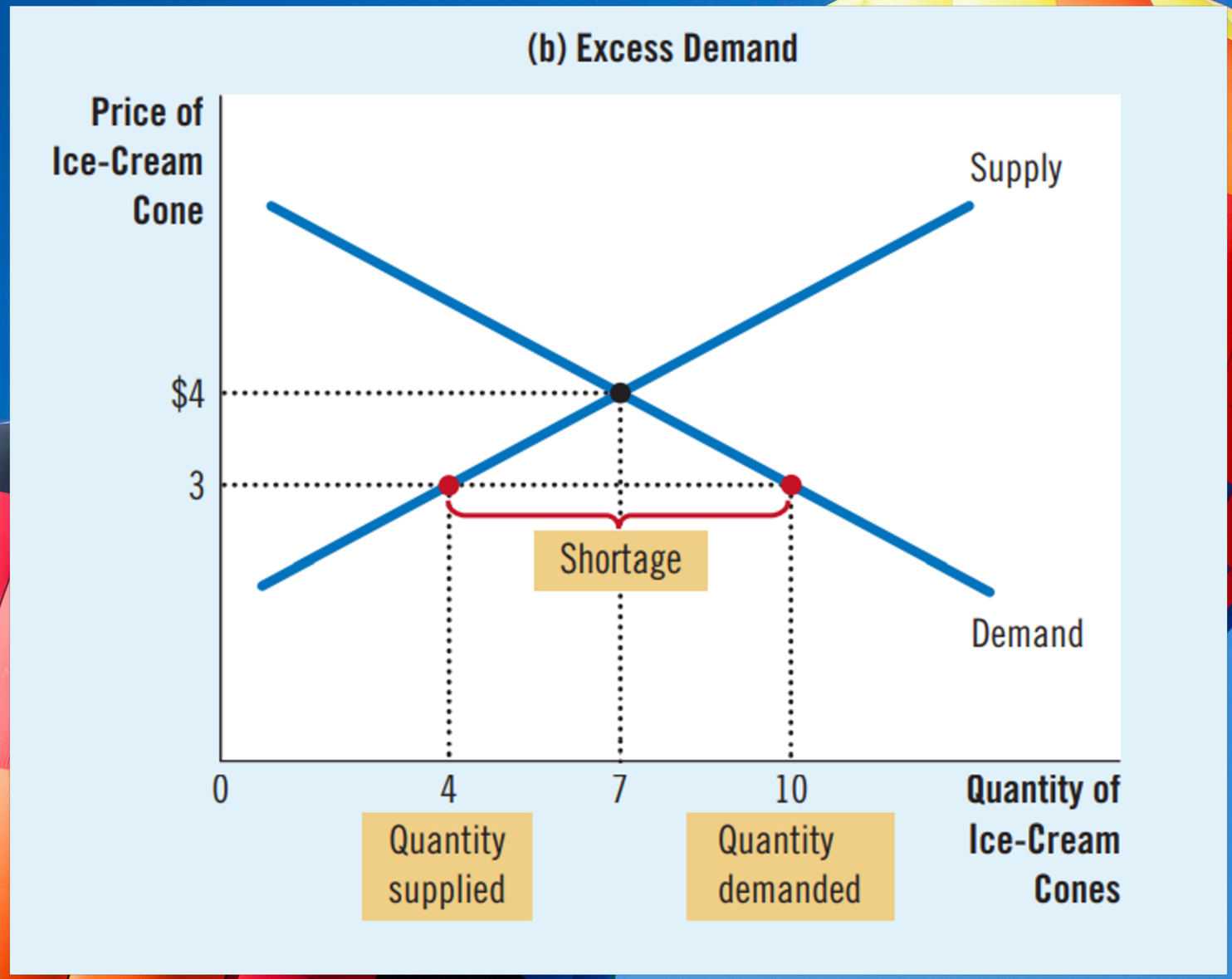



(a) Excess Supply
Price of Ice-Cream Cone
Supply
Surplus
$5
4
Demand
0
4
7
10
Quantity of Ice-Cream Cones
Quantity demanded
Quantity supplied

Shortage

- A situation in which quantity demanded is greater than quantity supplied.
- Excess Demand
- Upward pressure on price.
    - Decrease in quantity demanded.
    - Increase in quantity supplied.




(b) Excess Demand
Price of Ice-Cream Cone
Supply
$4
3
Shortage
Demand
0
4
7
10
Quantity of Ice-Cream Cones
Quantity supplied
Quantity demanded

Disequilibrium Conditions

- Surplus (Excess Supply)

$$Q_S > Q_D$$
$$P > P^*$$

- Shortage (Excess Demand)

$$Q_D > Q_S$$
$$P < P^*$$

Producers and Consumers in Equilibrium

- Producers & Consumers don’t compete against each other in the market!
- Producers are in competition with other producers to provide the lowest cost good (or some other alternative).
- Consumers are in competition with other consumers to provide the highest bid for a good.

Producers and Consumers in Equilibrium

- In surplus, producers lower price to outcompete other producers.
- In shortage, buyers rush to purchase (and therefore push up the price).

Practice Problem 3

- Let demand be given by $Q = 50 - .5P$; let supply be given by $Q = -25 + P$.
- If the price is $40, is the market in equilibrium?
- If not, is there a surplus or shortage?

Answer

Step 1: Find Quantity Demanded

$$Q_d = 50 - 0.5(40)$$

$$Q_d = 50 - 20 = 30$$

Step 2: Find Quantity Supplied

$$Q_s = -25 + 40$$

$$Q_s = 15$$

Step 3: Check Equilibrium

At $P = 40$:

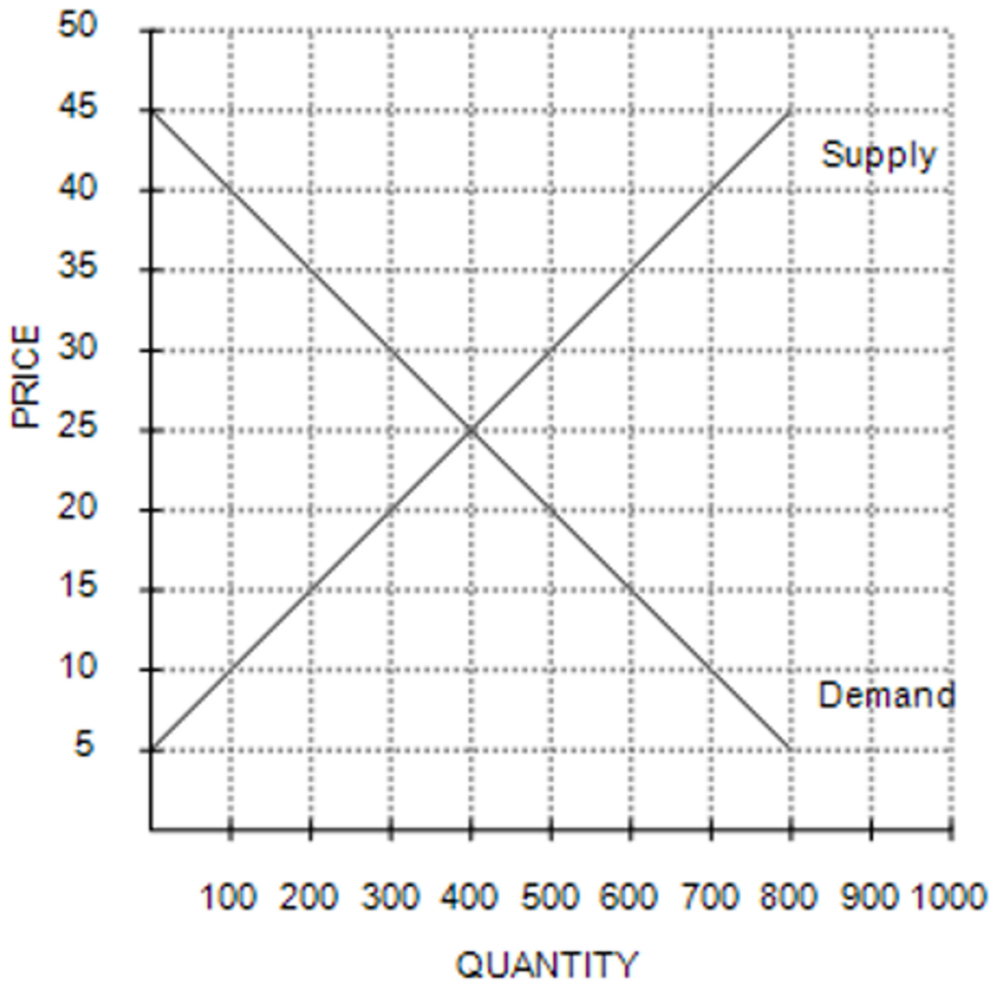
- Quantity demanded = 30
- Quantity supplied = 15

Since $Q_d \neq Q_s$, the market is **not in equilibrium**.

Step 4: Surplus or Shortage?

- If $Q_d > Q_s$ → **Shortage**
- Here $30 > 15$, so there is a **shortage of 15 units**.

More practice



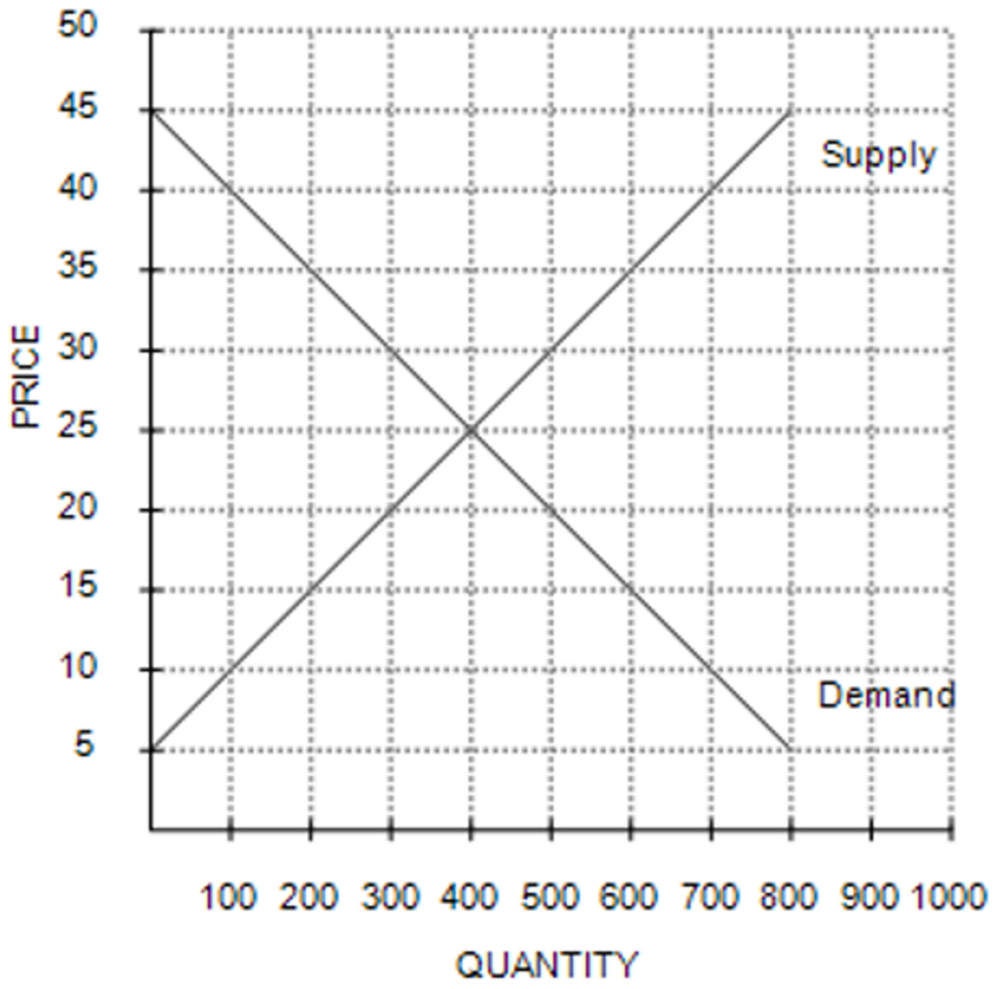
Equilibrium price and quantity are, respectively,

a. $30 and 500 units.

b. $20 and 300 units.

c. $25 and 400 units.

d. $15 and 200 units.



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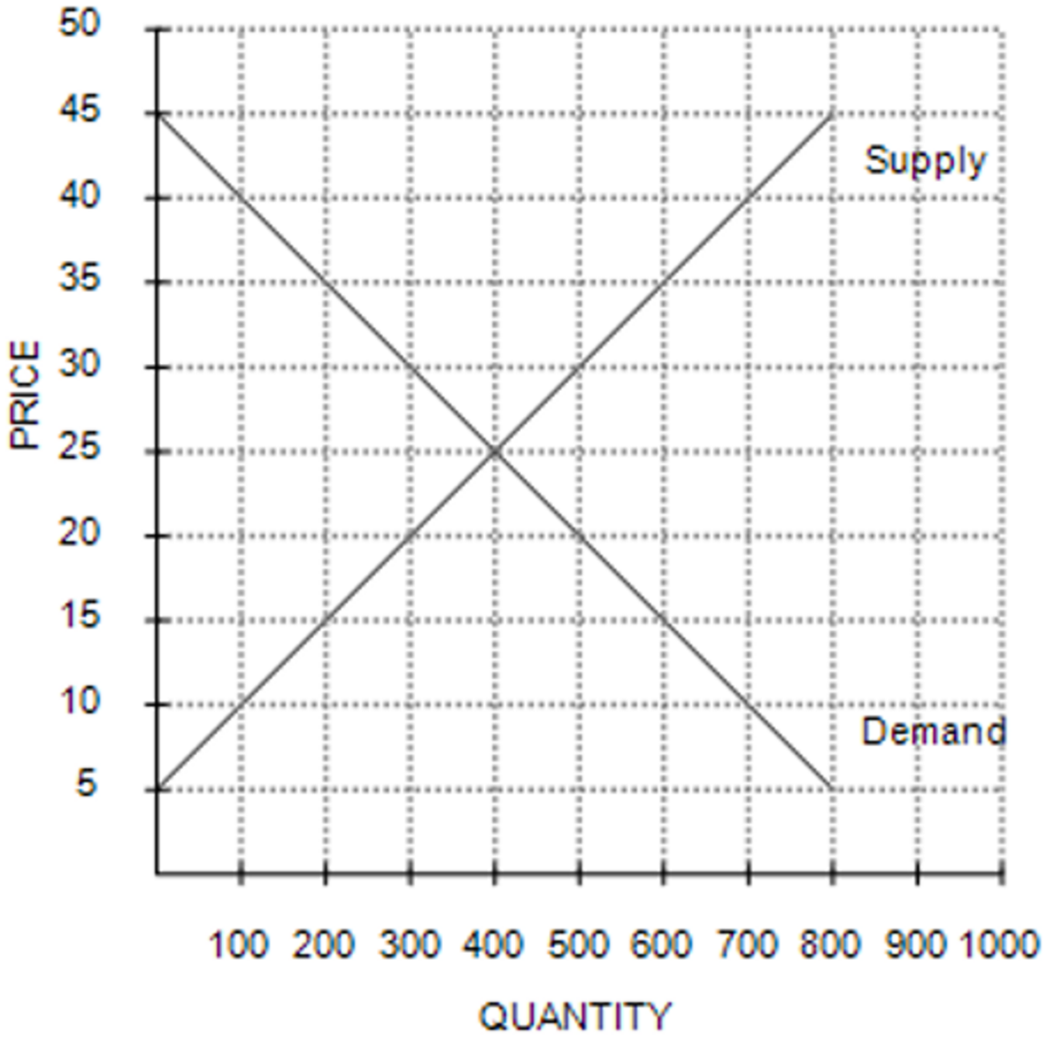


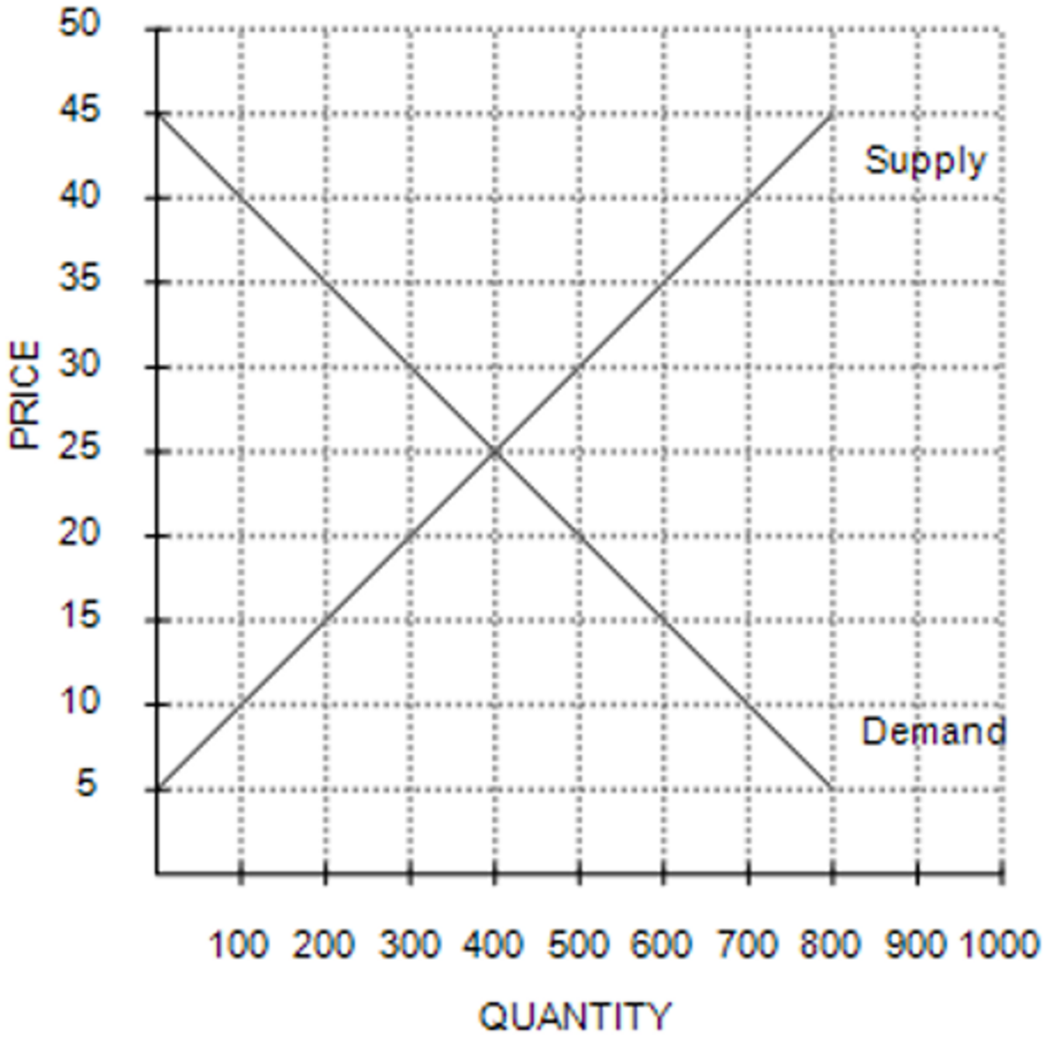
At a price of $15, there would be a

a. surplus of 400 units.

b. surplus of 200 units.

c. shortage of 400 units.

d. shortage of 200 units.



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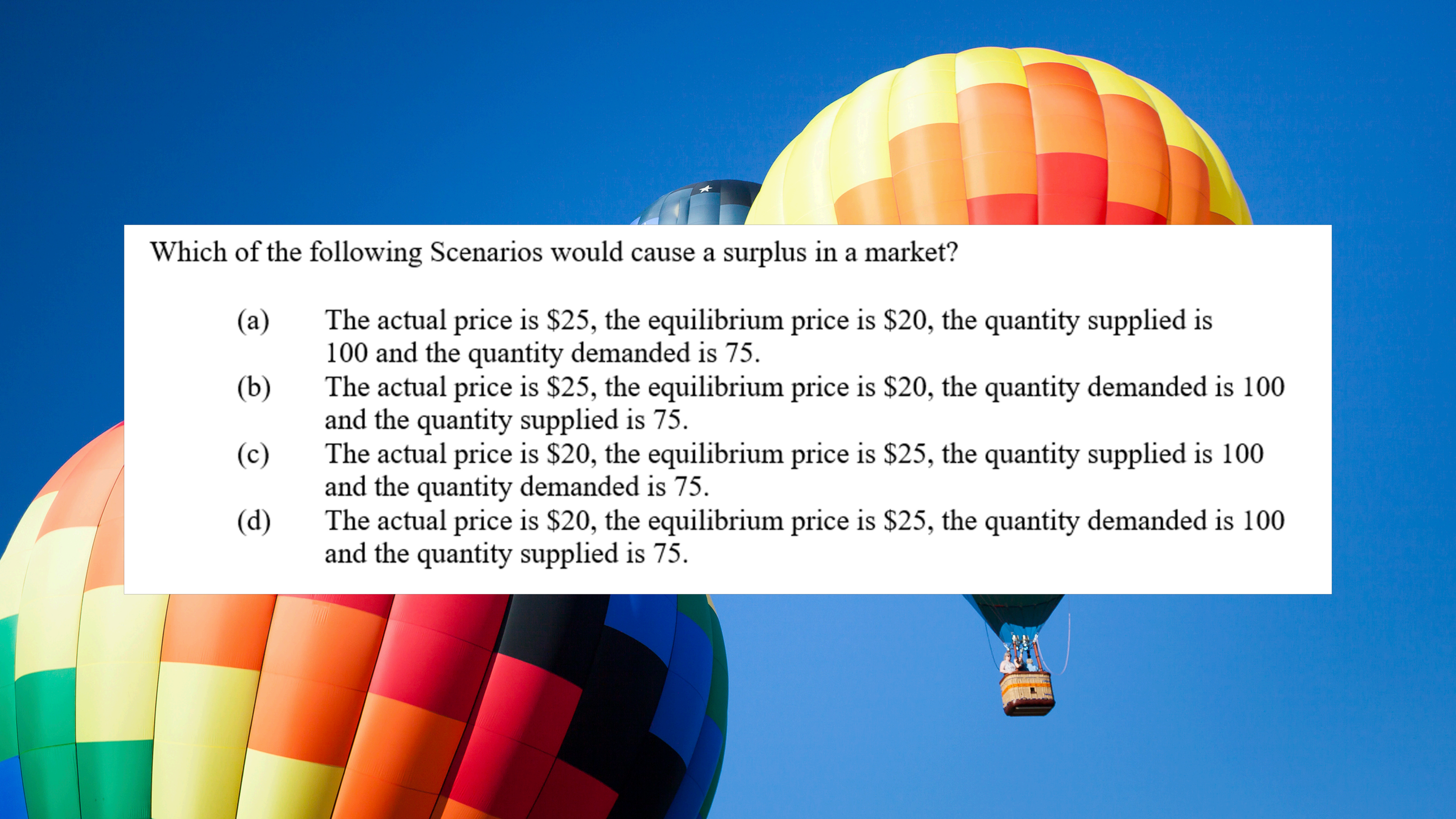


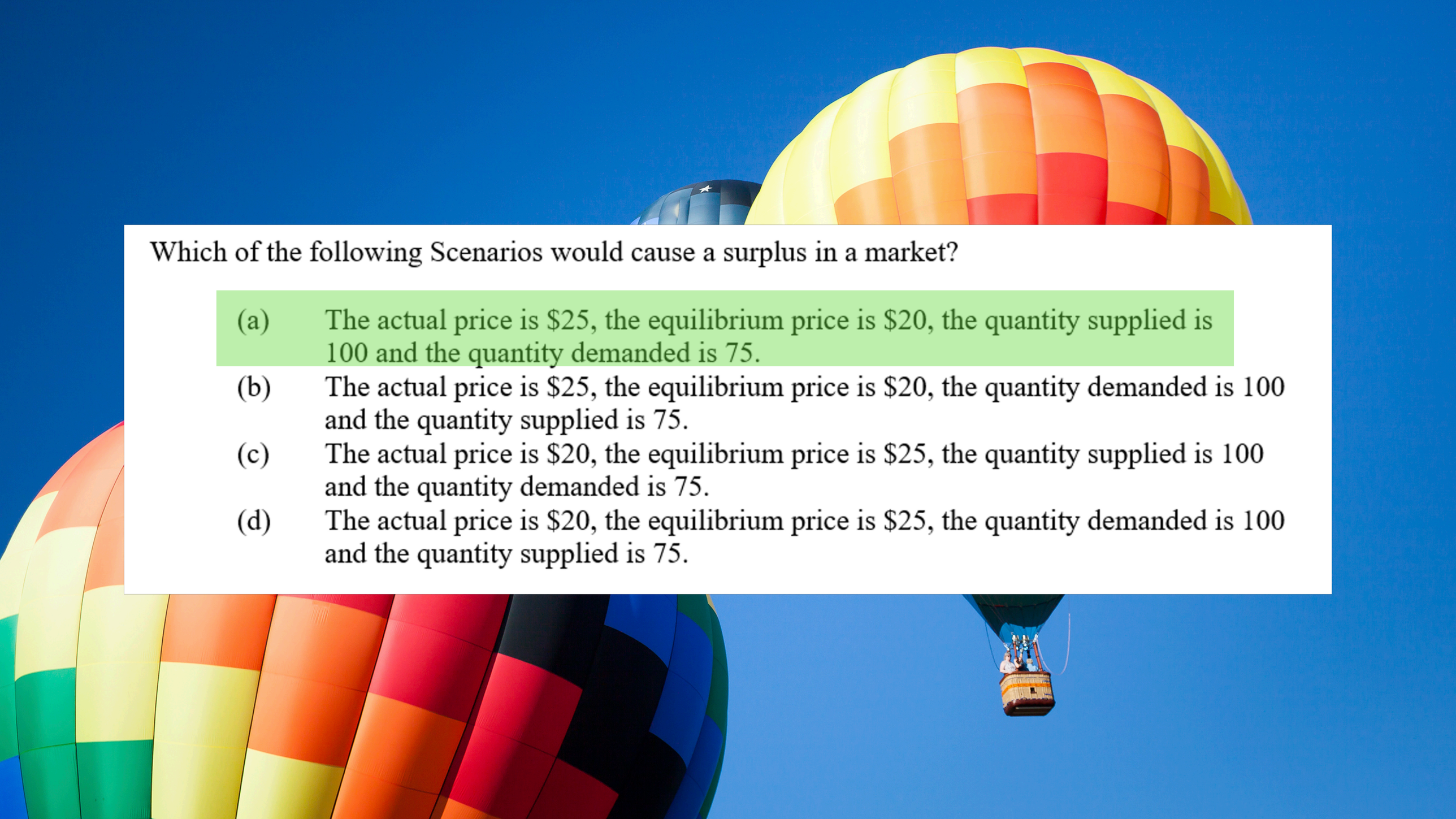
Which of the following Scenarios would cause a surplus in a market?

(a) The actual price is $25, the equilibrium price is $20, the quantity supplied is 100 and the quantity demanded is 75.

(b) The actual price is $25, the equilibrium price is $20, the quantity demanded is 100 and the quantity supplied is 75.

(c) The actual price is $20, the equilibrium price is $25, the quantity supplied is 100 and the quantity demanded is 75.

(d) The actual price is $20, the equilibrium price is $25, the quantity demanded is 100 and the quantity supplied is 75.



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(d) The actual price is $20, the equilibrium price is $25, the quantity demanded is 100 and the quantity supplied is 75.

So what?

The Law of Supply & Demand

- The price of any good adjusts to bring the quantity supplied & quantity demanded into balance. Equilibrium!
- Surpluses & Shortages are temporary.
- If the price system is free to function, markets will clear (or equilibrate).


Equilibrium
Perfectly balanced.
As all things should be.

Thanks for your attention!