

An aerial photograph of a city landscape. In the foreground, there is a large green golf course with a winding path and a small pond. A multi-lane road curves through the middle of the image, intersecting with another road. The background shows a city skyline with various buildings under a clear blue sky.

Unit 1

Individual and Market Demand (Ch. 5)

9/18

ECON 323 – MICROECONOMIC THEORY – DR. STRICKLAND

Let's practice!



Suppose Bob consumes burgers (x) and fries (y), which give him a utility of $U(X,Y) = X^{0.6}Y^{0.4}$. Bob's marginal utility for burgers is given by $MU_x = 0.6X^{-0.4}Y^{0.4}$ and his marginal utility for fries is given by $MU_y = 0.4X^{0.6}Y^{-0.6}$.

He has \$20 to spend, and the original prices of burgers and fries are \$6 and \$2, respectively. At these prices, Bob consumes 2 burgers and 4 fries, which gives him a utility of 2.64.

Suppose the price of burgers increases to \$10. What are the substitution and income effects of this price change?

X: BURGERS y: FRIES

$$U(X,Y) = X^{0.6}Y^{0.4}, MU_X = 0.6X^{-0.4}Y^{0.4}, MU_Y = 0.4X^{0.6}Y^{-0.6}, P_X^1 = \$6, P_X^2 = \$10, P_Y = \$2, I = \$20$$

old PRICE
new PRICE

ORIG. BUNDLE A

$$X^* = 2, y^* = 4, u = 2.64$$

NEW BUNDLE B

$$X^* = 1.2, y^* = 4,$$

SUB BUNDLE A'

$$X = 1.6, y = 5.4$$

SE: A → A'

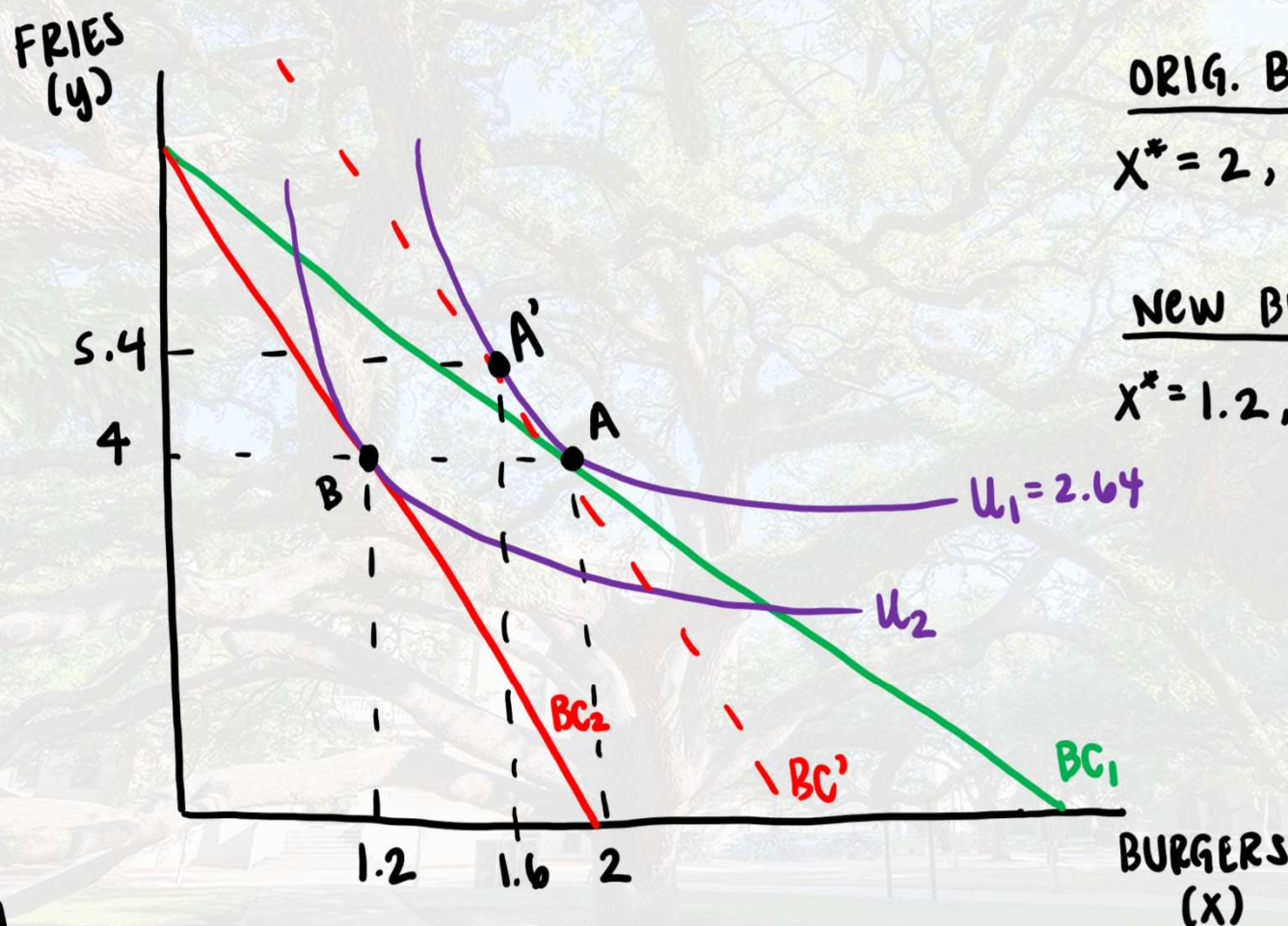
$$\Delta X = 1.6 - 2 = \boxed{-0.4}$$

$$\Delta y = 5.4 - 4 = \boxed{1.4}$$

IE: A' → B

$$\Delta X = 1.2 - 1.6 = \boxed{-0.4}$$

$$\Delta y = 4 - 5.4 = \boxed{-1.4}$$



$$U(X,Y) = X^{0.6}Y^{0.4}, MU_X = 0.6X^{-0.4}Y^{0.4}, MU_Y = 0.4X^{0.6}Y^{-0.6}, P_X^1 = \$6, P_X^2 = \$10, P_Y = \$2, I = \$20$$

① FIND NEW BUNDLE (UMP)

(i) TANGENCY CONDITION: $\underline{MRS_{xy}} = \underline{\frac{P_x^2}{P_y}}$

$$MRS_{xy} = \frac{MU_X}{MU_Y} = \frac{0.6X^{-0.4}Y^{0.4}}{0.4X^{0.6}Y^{-0.6}} = \frac{0.6}{0.4} X^{-0.4-0.6} Y^{0.4--0.6} = \frac{0.6}{0.4} \frac{Y}{X} = \frac{1.5Y}{X}$$

$$\frac{1.5Y}{X} = \frac{10}{2} \Rightarrow 3Y = 10X \Rightarrow Y = \frac{10}{3}X \Rightarrow \underline{Y = 3.33X} \text{ OCR}$$

(ii) PLUG OCR INTO BC

$$BC_2: 20 = 10X + 2Y$$

$$20 = 10X + 2(3.33X)$$

$$20 = 16.66X$$

$$\boxed{X^* = 1.2}$$

(iii) PLUG X^* INTO OCR

$$Y^* = 3.33(X^*) = 3.33(1.2) = \boxed{4}$$

$$U(X,Y) = X^{0.6}Y^{0.4}, MU_X = 0.6X^{-0.4}Y^{0.4}, MU_Y = 0.4X^{0.6}Y^{-0.6}, P_X^1 = \$6, P_X^2 = \$10, P_Y = \$2, I = \$20$$

② FIND SUB BUNDLE

* NEED NEW RELATIVE PRICES, ORIG. PREFS, ORIG. UTILITY LEVEL

(i) NEW RELATIVE PRICES & ORIG PREFS \Rightarrow TANGENCY CONDITION: $MRS_{xy} = \frac{P_X^2}{P_Y}$

SOLVED THIS ALREADY (OCR OF NEW BUNDLE) : $y = 3.33x$

(ii) ORIG. UTILITY LEVEL \Rightarrow PLUG THIS OCR INTO UTIL. FUNCTION & SET EQUAL TO ORIG. UTILITY LEVEL

$$U = X^{0.6}Y^{0.4} = 2.64$$

$$X^{0.6}(3.33X)^{0.4} = 2.64$$

$$\underline{X^{0.6}}(3.33)^{0.4}\underline{X^{0.4}} = 2.64$$

$$(3.33)^{0.4}X' = 2.64$$

$$X = \frac{2.64}{1.62} \approx \boxed{1.6}$$

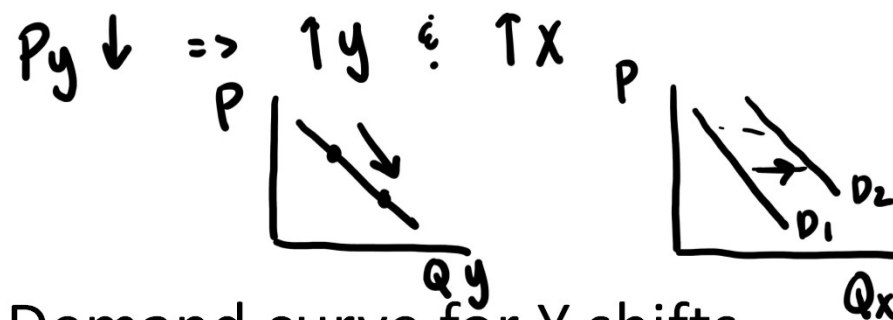
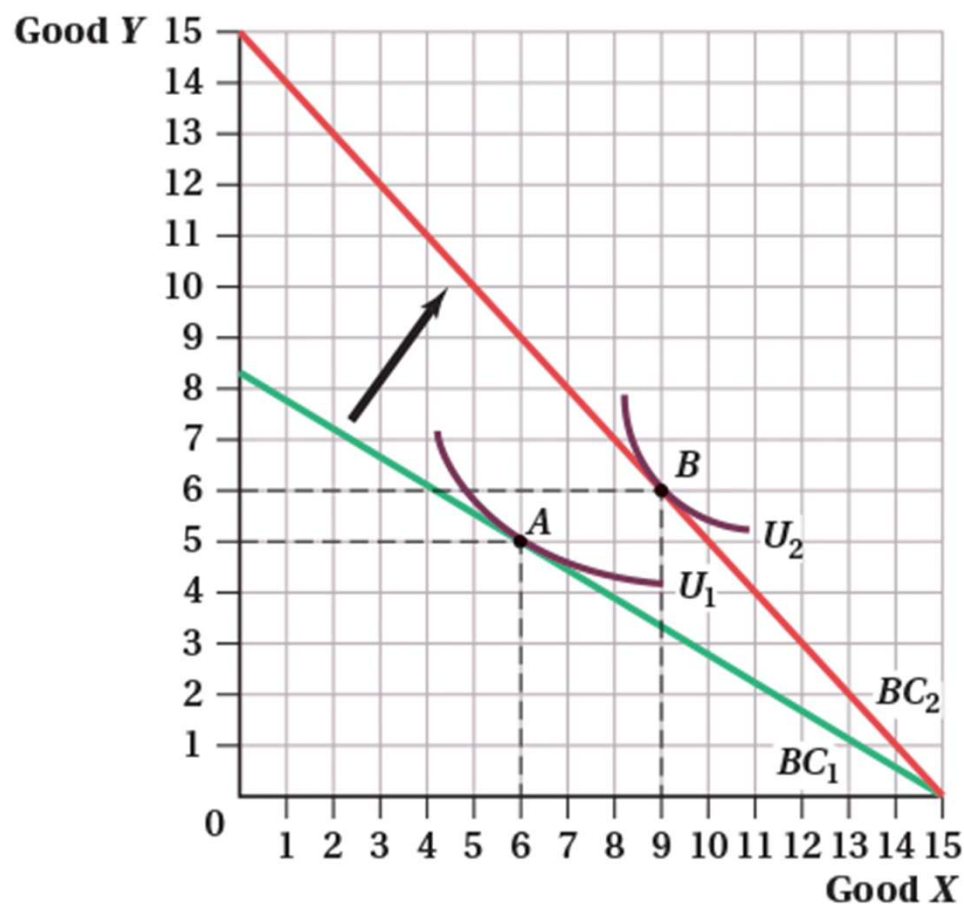
(iii) PLUG GOOD BACK INTO OCR

$$y = 3.33(1.6) \approx \boxed{5.4}$$

③ CALC SUB + INC. EFFECTS

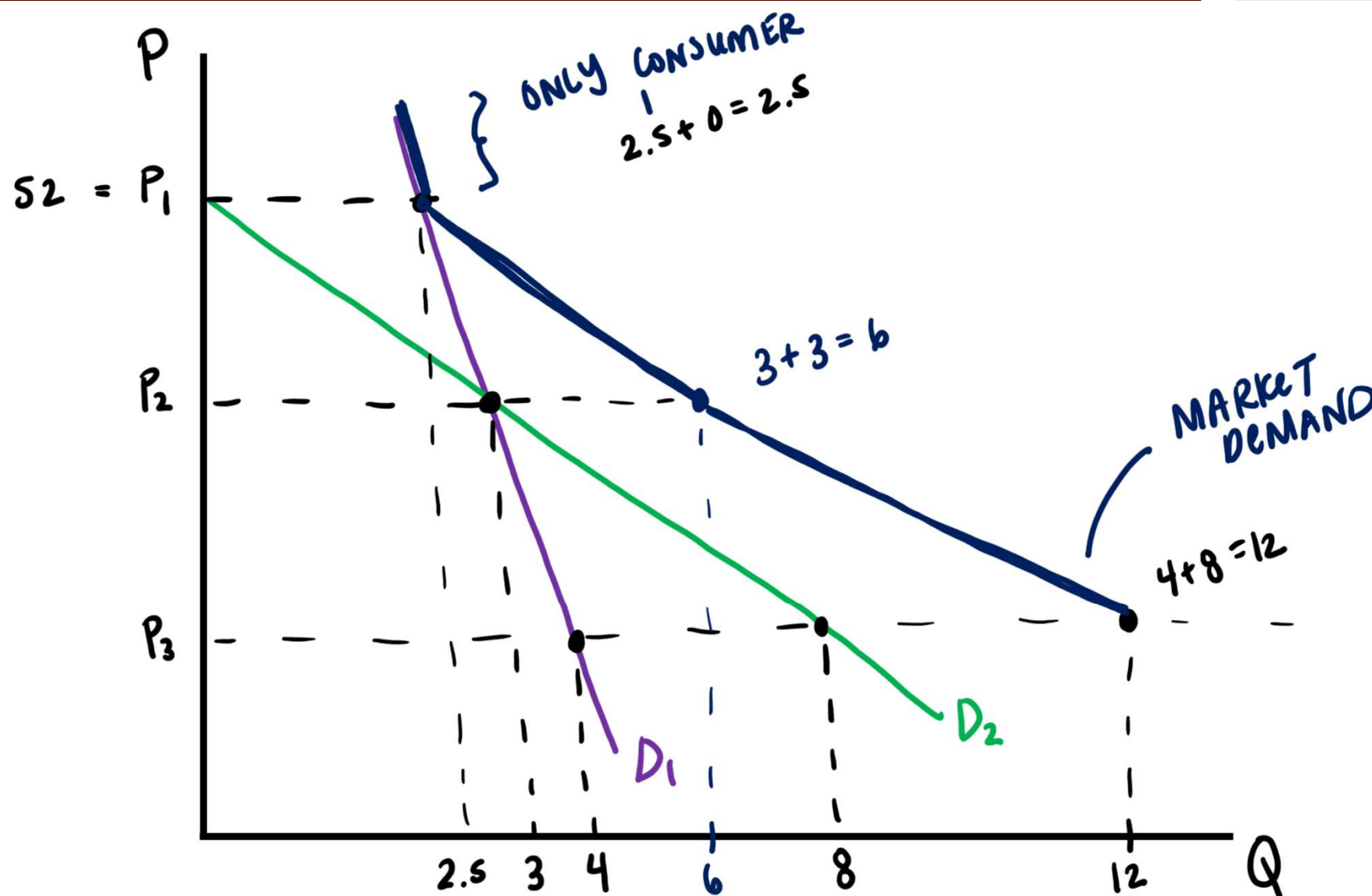
(calculation on picture slide)

Which of the following is TRUE?



- A. Demand curve for Y shifts inward
- B. Demand curve for Y shifts outward
- C. Demand curve for X shifts inward
- D. Demand curve for X shifts outward**

Finding Market Demand



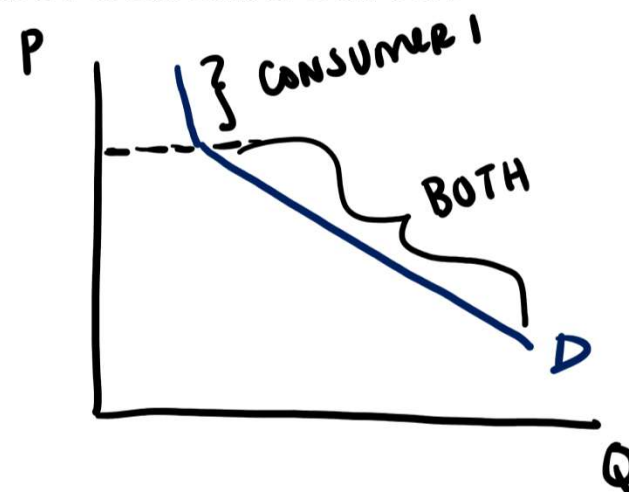
Finding Market Demand



Suppose Consumer 1's demand is given by $Q_1 = 50 - 0.5P$ and Consumer 2's demand is given by $Q_2 = 13 - 0.25P$. What is the market demand curve?

$$Q_{MKT} = Q_1 + Q_2$$

$$\begin{aligned} Q_{MKT} &= (50 - 0.5P) + (13 - 0.25P) \\ &= \underline{63 - 0.75P} \end{aligned}$$



$$Q_{MKT} = \begin{cases} 50 - 0.5P & \text{IF } 52 \leq P < 100 \\ 63 - 0.75P & \text{IF } P < 52 \end{cases}$$

C2'S DEMAND CHOKE PRICE:

$$Q_2 = 0 = 13 - 0.25P$$

$$\Rightarrow \underline{P = 52}$$

C1'S DEMAND CHOKE:

$$Q_1 = 0 = 50 - 0.5P \Rightarrow \underline{P = 100}$$