Unit 1
Consumer Behavior (Ch. 4)
9/9

ECON 323 – MICROECONOMIC THEORY – DR. STRICKLAND

Let's practice!

Kevin gets utility from soda (S) and hotdogs (H); his utility function is given by $U = S^{0.5}H^{0.5}$. His marginal utility for soda is $MU_S = 0.5S^{-0.5}H^{0.5}$. His marginal utility for hot dogs is $MU_H = 0.5S^{0.5}H^{-0.5}$. Kevin's income is \$12, and the prices of sodas and hotdogs are \$2 and \$3, respectively.

Answer the following:

What is Kevin's utility-maximizing bundle of sodas and hotdogs?

Let's practice!

$= \frac{0.5H^{0.5}}{S^{0.5}}$

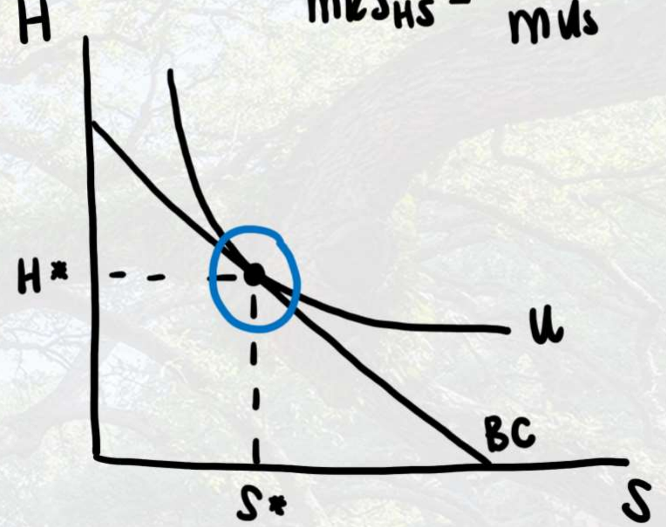
EXPONENT RULES:

$X^{-n} = \frac{1}{X^n} \qquad \frac{X^n}{X^m} = X^{n-m}$

$U = S^{0.5}H^{0.5}$, $MU_S = 0.5S^{-0.5}H^{0.5}$, $MU_H = 0.5S^{0.5}H^{-0.5}$, I=\$12, P_S = \$2, P_H = \$3

① TANGENCY CONDITION: $MRS_{xy} = \frac{P_x}{P_y}$

$MRS_{HS} = \frac{MU_H}{MU_S} = \frac{P_H}{P_S}$



$MRS_{SH} = \frac{P_S}{P_H} \Rightarrow \frac{MU_S}{MU_H} = \frac{P_S}{P_H}$

$\frac{\cancel{0.5}S^{-0.5}H^{0.5}}{\cancel{0.5}S^{0.5}H^{-0.5}} = S^{-0.5-0.5} \cdot H^{0.5--0.5}$

$= S^{-1} \cdot H^{1} = \frac{H}{S}$

$\frac{H}{S} = \frac{2}{3} \Rightarrow 3H = 2S \Rightarrow H = \frac{2}{3}S$

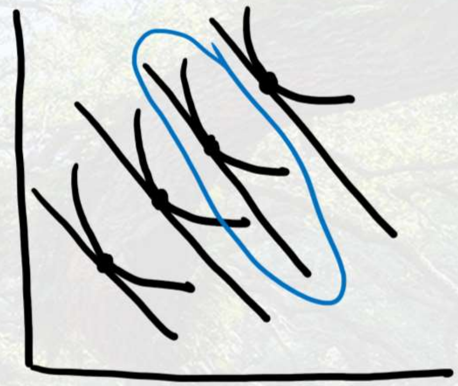
"OPTIMAL CONSUMPTION RATIO"
(OCR)

Let's practice!

$U = S^{0.5}H^{0.5}$, $MU_S = 0.5S^{-0.5}H^{0.5}$, $MU_H = 0.5S^{0.5}H^{-0.5}$, I=\$12, P_S = \$2, P_H = \$3

② PLUG OCR INTO BC & SOLVE FOR ONE GOOD

OCR : $H = \frac{2}{3}S$ BC: $12 = 2S + 3H$



$12 = 2S + 3\left(\frac{2}{3}\right)S$

$12 = 2S + 2S$

$12 = 4S$

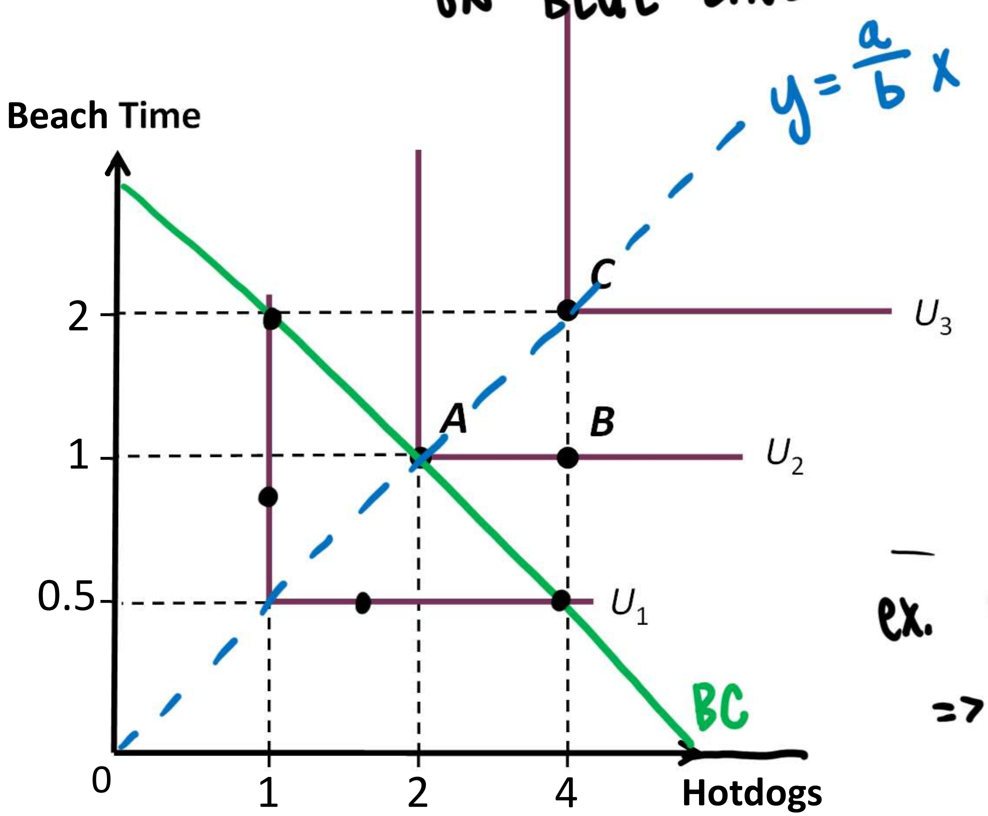
$\boxed{S^* = 3}$

③ PLUG GOOD FROM ② INTO OCR

$H^* = \frac{2}{3}S^* \Rightarrow H^* = \frac{2}{3}(3) = \boxed{2}$

Special Case: Perfect Complements

* NO TANGENCY CONDITION
* ALL UTILITY MAX BUNDLES OCCUR ON BLUE LINE



$U = \min\{ax, by\}$

① FIND OCR: $y = \frac{a}{b}x$

$ax = by \Rightarrow y = \frac{a}{b}x$

② PLUG OCR INTO BC

③ PLUG GOOD FROM ② INTO OCR

ex. $U = \min\{0.5x, y\}$

$\Rightarrow$ OCR: $y = 0.5x$

Special Case: Corner Solutions

Often, consumers choose a bundle that includes **both** goods

- These are **interior solutions.**

In some cases, however, a consumer will maximize utility by consuming **all** of one good and **none** of the other good.

- These are **corner solutions.**

Let's practice!

Damien has the utility function $U(X, Y) = X + 2Y$ where X is the number of 10-ounce cups of coffee and Y is the number of 20-ounce cups of coffee. His marginal utility for 10-ounce cups is 1, while his marginal utility for 20-ounce cups is 2.

$MU_y = 2$

$MU_x = 1$

Suppose Damien has \$6 to spend on coffee each day and that the price of a 10-ounce cup is \$2 and the price of a 20-ounce cup is \$3.

$P_x = 2$

$P_y = 3$

Find Damien's optimal bundle of 10-ounce and 20-ounce cups of coffee.

$U(X, Y) = X + 2Y$, $MU_X=1$, $MU_Y=2$, $I=6$, $P_X=2$, $P_Y=3$

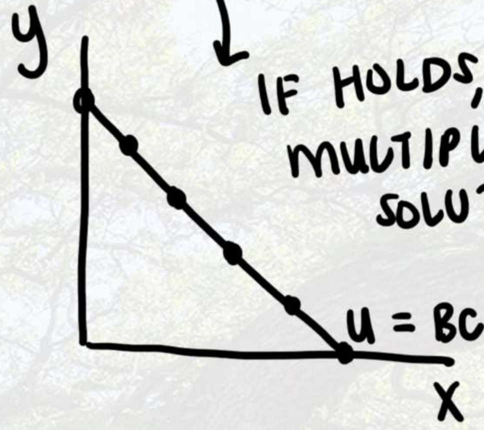
X: 10 oz cups

y: 20 oz cups

① CHECK TANGENCY CONDITION FOR INTERIOR SOLUTIONS

$$MRS_{xy} = \frac{P_x}{P_y}$$

$$\frac{MU_x}{MU_y} = \frac{1}{2} \neq \frac{2}{3}$$



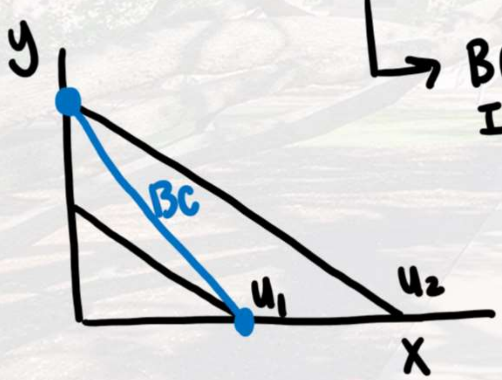
IF HOLDS, MULTIPLE SOLUTIONS

② FIND CORNER SOLUTION

OPTION 1: COMPARE MRS_{xy} & $\frac{P_x}{P_y}$

$$MRS_{xy} = \frac{1}{2} < \frac{2}{3} = \frac{P_x}{P_y}$$

→ BC STEEPER THAN IC, SO ONLY CHOOSE y



$$\boxed{y^* = \frac{6}{3} = 2 \quad x^* = 0}$$

OPTION 2: CHECK CORNERS

- ONLY X

  $x = \frac{6}{2} = 3$, $y = 0$

  $u = (3) + 2(0) = \underline{3}$

- ONLY y

  $y = \frac{6}{3} = 2$, $x = 0$

  $u = (0) + 2(2) = \underline{4}$ ✓