Unit 1
Individual and Market Demand (Ch. 5)
9/16

ECON 323 – MICROECONOMIC THEORY – DR. STRICKLAND

Decomposing Price Effects for a Normal Good

A: ORIG. BUNDLE
B: NEW BUNDLE
A': SUB BUNDLE

$P_x \uparrow$ ($P_{eggs} \uparrow$)

1. EGGS RELATIVELY MORE EXPENSIVE THAN BEEF (SE)
2. FEEL POORER (P.P. ↓) (IE)

- A → B: TE

$\Delta X = X_B - X_A$ (-)

$\Delta y = y_B - y_A$ (-)

- A → A': SE

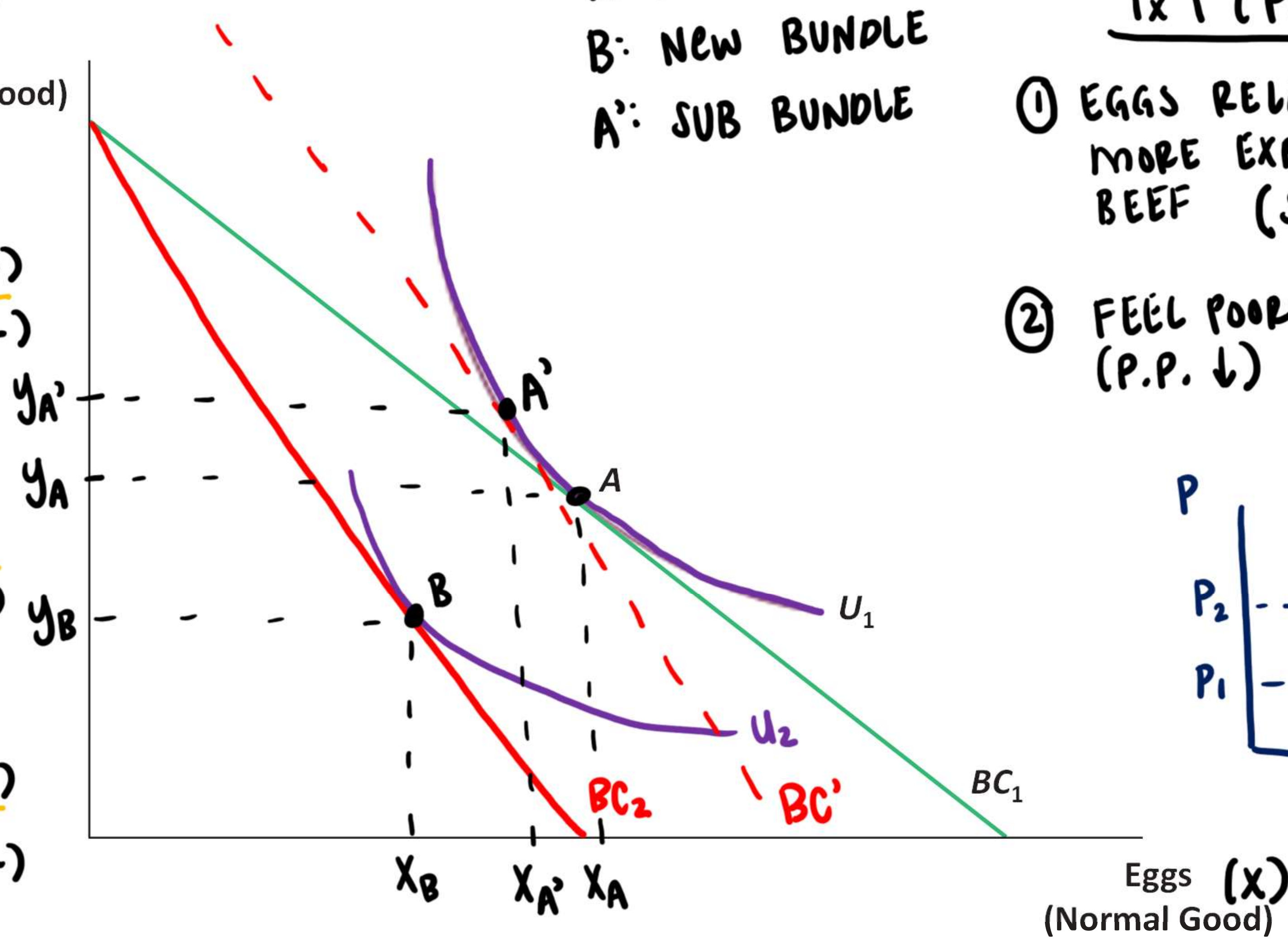
$\Delta X = X_{A'} - X_A$ (-)

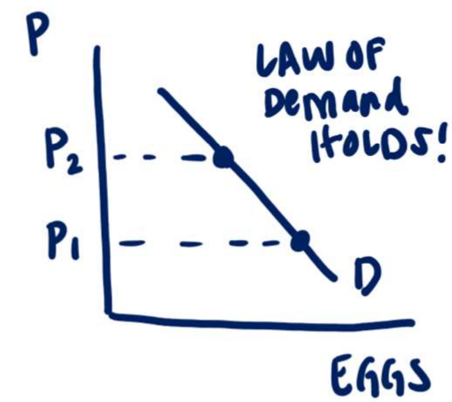
$\Delta y = y_{A'} - y_A$ (+)

- A' → B: IE

ΔX: $X_B - X_{A'}$ (-)

Δy: $y_B - y_{A'}$ (-)





Decomposing Price Effects for an Inferior Good

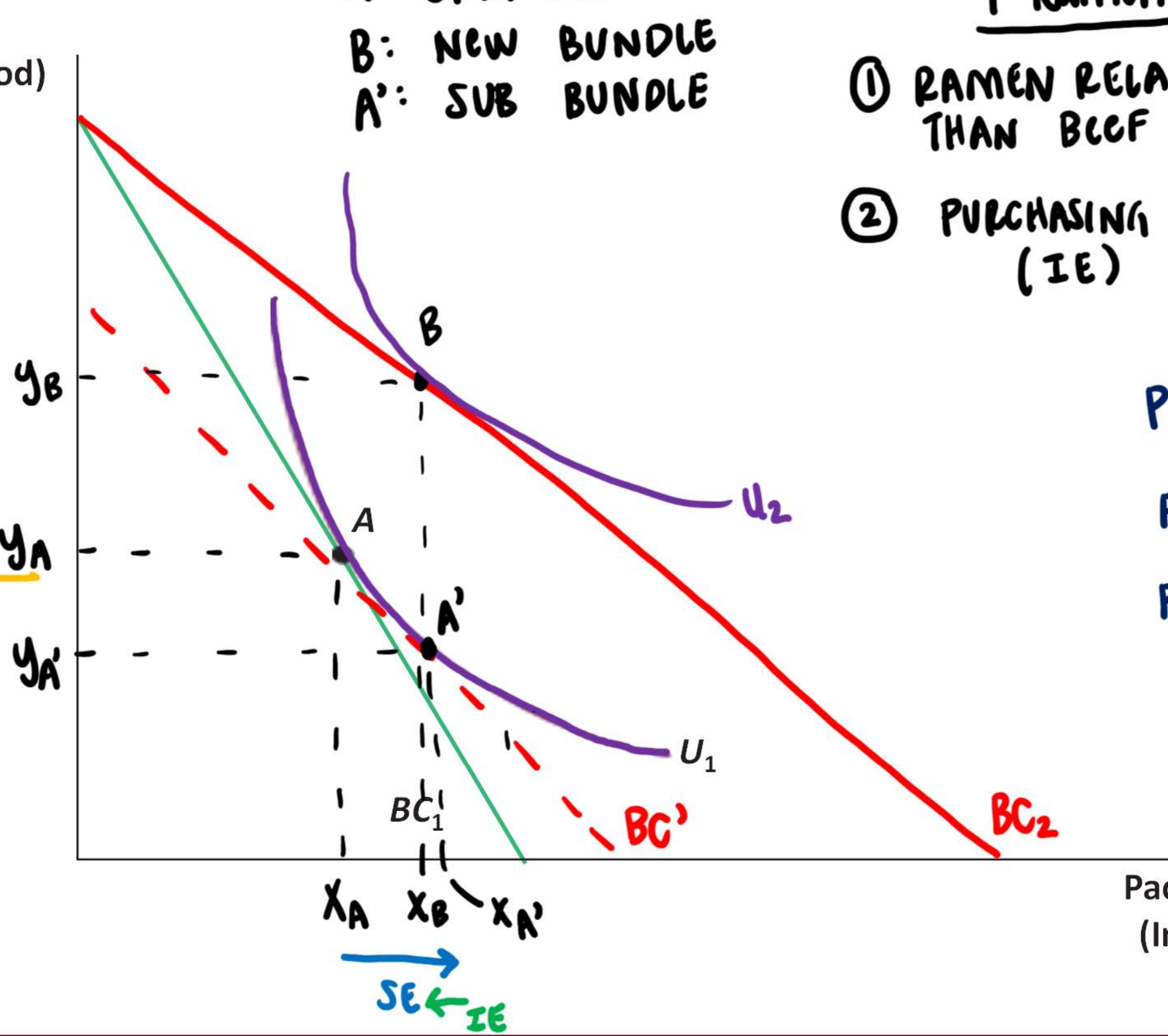
A : ORIG BUNDLE
B : NEW BUNDLE
A' : SUB BUNDLE

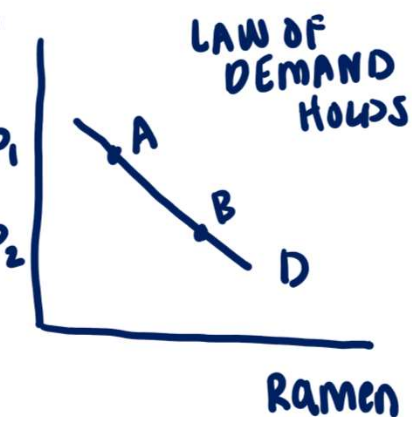
<u>P RAMEN ↓</u> $(P_x \downarrow)$

① RAMEN RELATIVELY CHEAPER THAN BEEF (SE)

② PURCHASING POWER (P.P.) ↑ (IE)

- A → B : TE
  - $\Delta X = X_B - X_A$ (+)
  - $\Delta y = y_B - y_A$ (+)
- A → A' : SE
  - $\Delta X = X_{A'} - X_A$ (+)
  - $\Delta y = y_{A'} - y_A$ (−)
- A' → B : IE
  - $\Delta X = X_B - X_{A'}$ (−)
  - $\Delta y = y_B - y_{A'}$ (+)



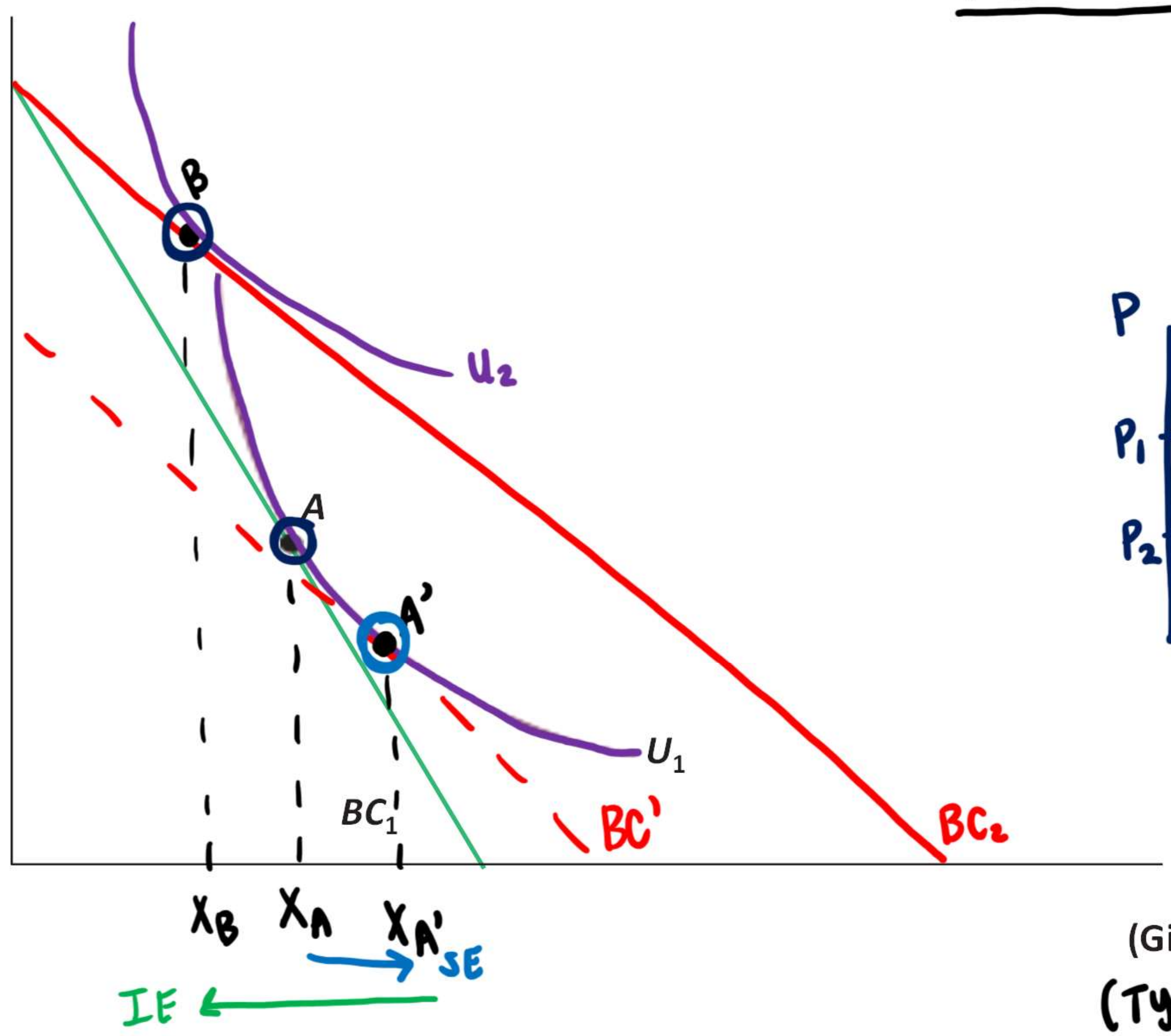


Decomposing Price Effects for a Giffen Good

P OF RICE ↓ $(P_x \downarrow)$

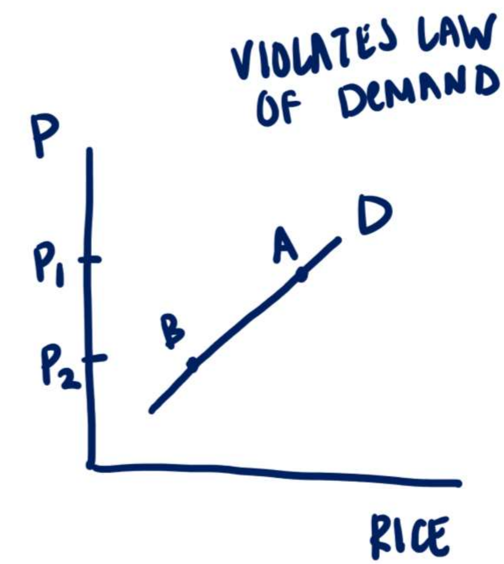
(y) Beef (Normal Good)

- $A \rightarrow B$: TE
  $\Delta X = X_B - X_A$ (−)
- $A \rightarrow A'$: SE
  $\Delta X = X_{A'} - X_A$ (+)
- $A' \rightarrow B$: IE
  $\Delta X = X_B - X_{A'}$ (−)



Rice (Giffen Good) (x)

(TYPE OF INFERIOR GOOD)



The Size of Substitution and Income Effects

What determines the size of the **substitution** effect?

- **Curvature** of indifference curves
- Why?

What determines the size of the **income** effect?

- **Quantity consumed** before the price change
- Suppose I split my weekly income between groceries and gas: 80% goes toward groceries and 20% goes toward gas
    - How would it feel if my HEB bill doubled?
    - How would it feel if my gas bill doubled?

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 $MU_Y = 0.4X^{0.6}Y^{-0.6}$.

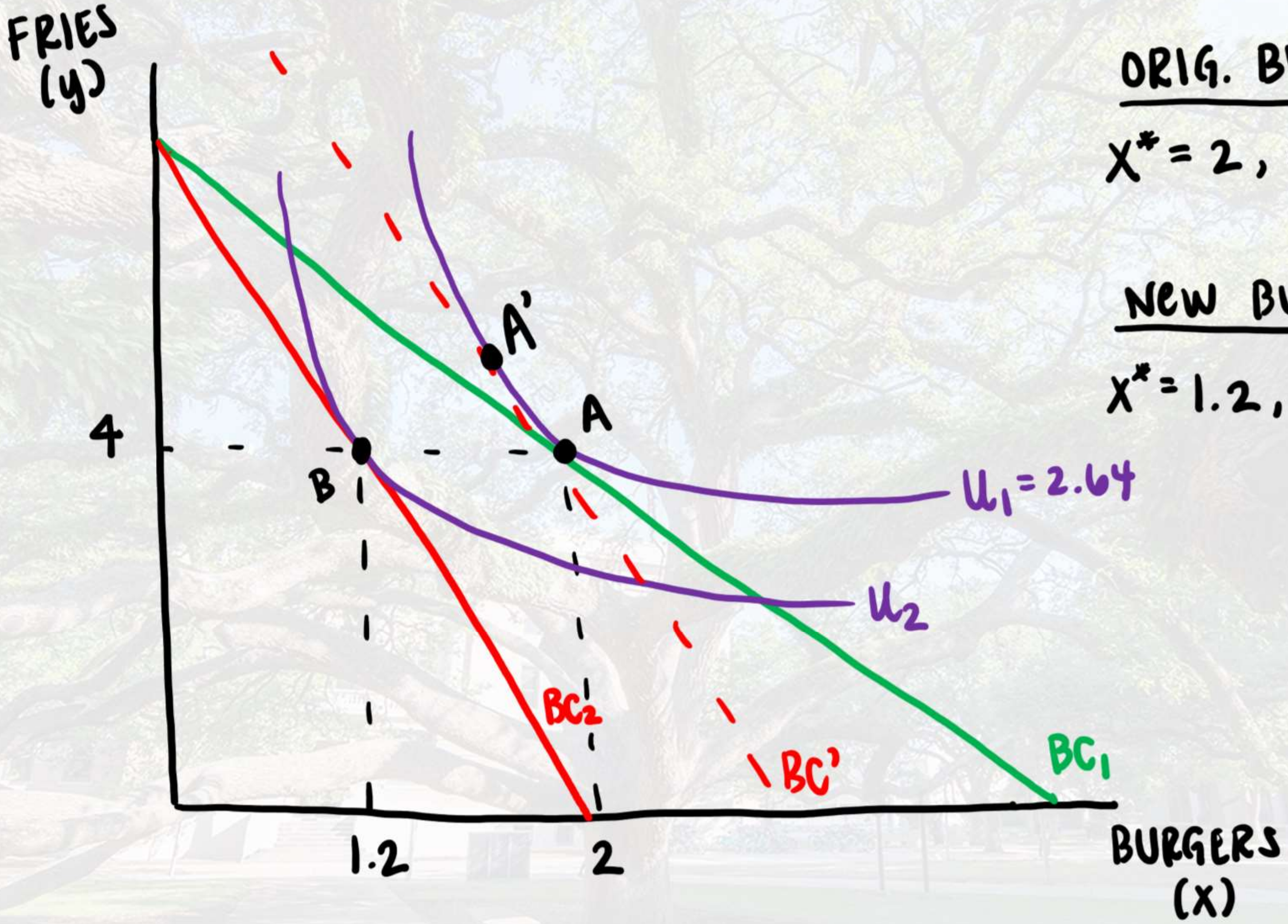
He has \$20 to spend, and the original prices of burgers and fries are \$6 and \$2, respectively. At these prices, Bob consumes 2 burgers and 4 fries, which gives him a utility of 2.64.

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'

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

① FIND NEW BUNDLE (UMP)

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

$$MRS_{xy} = \frac{MU_x}{MU_y} = \frac{0.6X^{-0.4}y^{0.4}}{0.4X^{0.6}y^{-0.6}} = \frac{0.6}{0.4} X^{-0.4-0.6} y^{0.4--0.6} = \frac{0.6}{0.4}\frac{y}{x} = \frac{1.5y}{x}$$

$$\frac{1.5y}{x} = \frac{10}{2} \Rightarrow 3y = 10x \Rightarrow y = \frac{10}{3}x \Rightarrow y = 3.33x$$ 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 => TANGENCY CONDITION: $MRS_{xy} = \frac{P_x^2}{P_y}$

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

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