ECO 601 1^{ST} Test KEY Fall 2002

(10 pts.) 1. TRUE. $\varepsilon_{x,P_x} + \varepsilon_{x,P_y} + \varepsilon_{x,P_z} + \varepsilon_{x,I} = 0$

$(-2) \quad (0.4) \quad (0.8)$

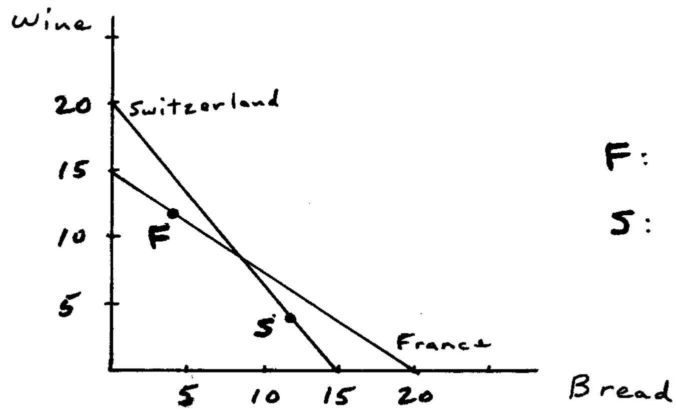
$\varepsilon_{x,I}$ therefore must equal 0.8, which makes it a necessity.

(10 pts.) 2. France: $P_B = 3f \quad B = 4 \quad P_w = 4f \quad w = 12$

$B \cdot P_B + w \cdot P_w = 60f$

Switzerland: $P_B = 4k \quad B = 12 \quad P_w = 3k \quad w = 4$

$B \cdot P_B + w \cdot P_w = 60k$

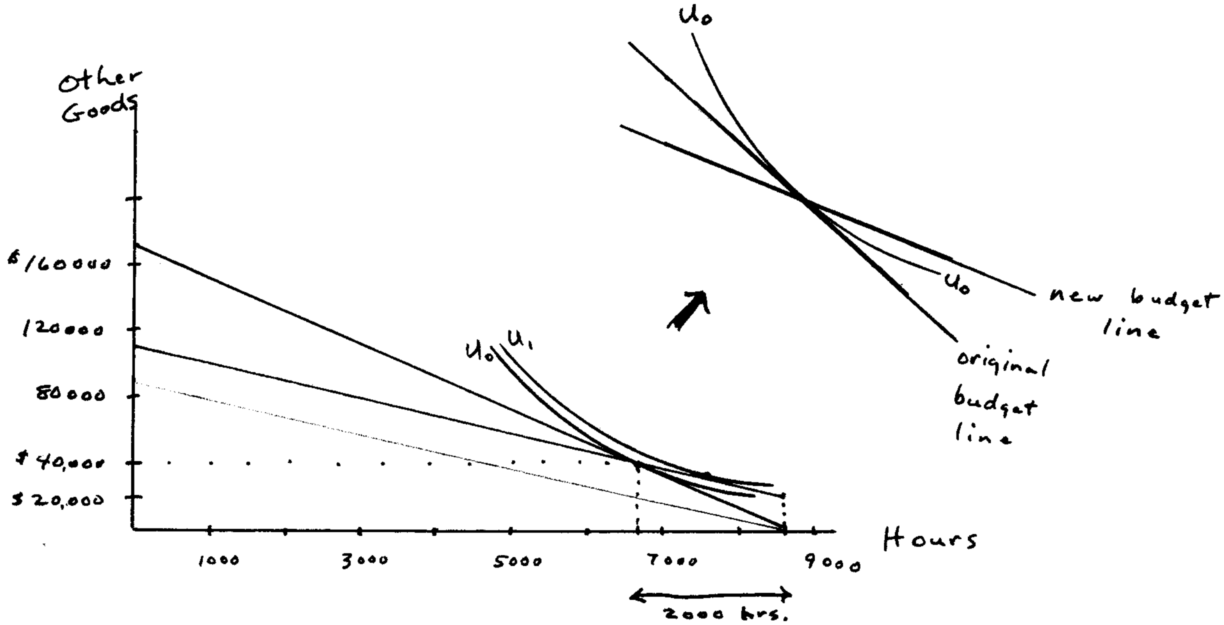


F: 4 Bread and 12 Wine

S: 12 Bread and 4 Wine

These consumption bundles can only occur if the French and the Swiss have different preferences for bread and wine, so TRUE

(10 pts.) 3.



Peter can consume the same bundle of leisure and other goods after he wins the lottery and ~~but~~ his wage rate falls, but he can reach a higher indifference curve if he substitutes away from work and consumes more leisure, so FALSE

(10 pts.) 4.

$$U(X,Y) = X^{\alpha} Y^{\beta}$$

$$X^* = \alpha I / P_x$$

$$\varepsilon_{x,I} = \frac{dX}{dI} \cdot \frac{I}{X}$$

$$\frac{dX}{dI} = \alpha / P_x \quad , \text{ so}$$

$$\varepsilon_{x,I} = (\alpha / P_x) \cdot I / (\alpha I / P_x)$$

$$\varepsilon_{x,I} = \frac{\alpha}{P_x} \cdot I \cdot \frac{P_x}{\alpha I} = 1$$

(35 pts.) 5. (a) $\frac{dX}{dP_Y} = \frac{dX}{dP_Y}\Big|_{\bar{u}} - Y \cdot \frac{dX}{dI}$ (5 pts)

(b) see diagram (5 pts)

(c) $\frac{dX}{dP_Y} = \frac{dX}{dP_Y}\Big|_{\bar{u}} - Y \cdot \frac{dX}{dI}$ (5 pts)

two goods $\Rightarrow \frac{dX}{dP_Y}\Big|_{\bar{u}} > 0$

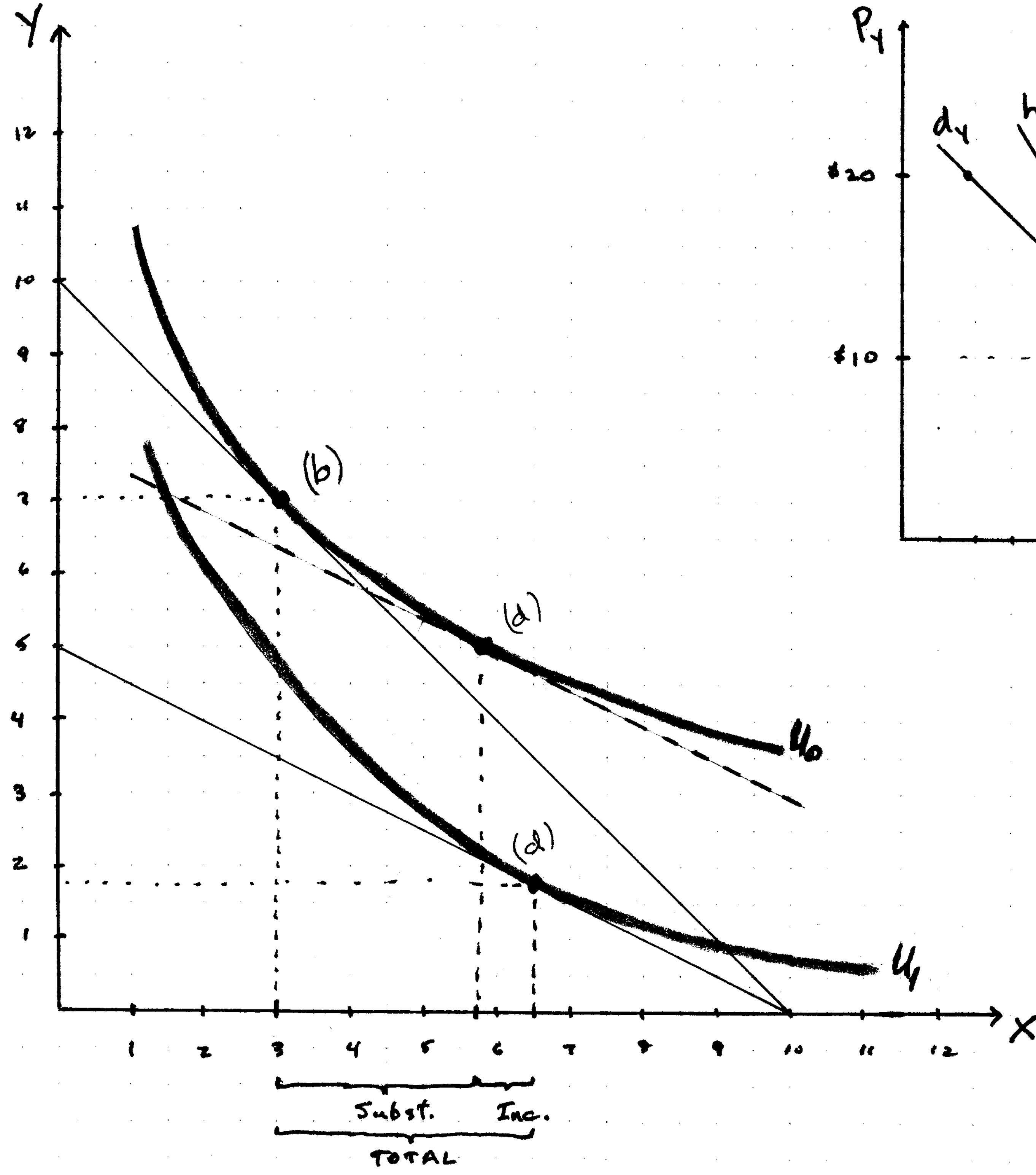
X is inferior $\Rightarrow \frac{dX}{dI} < 0$, and $-Y \cdot \frac{dX}{dI} > 0$

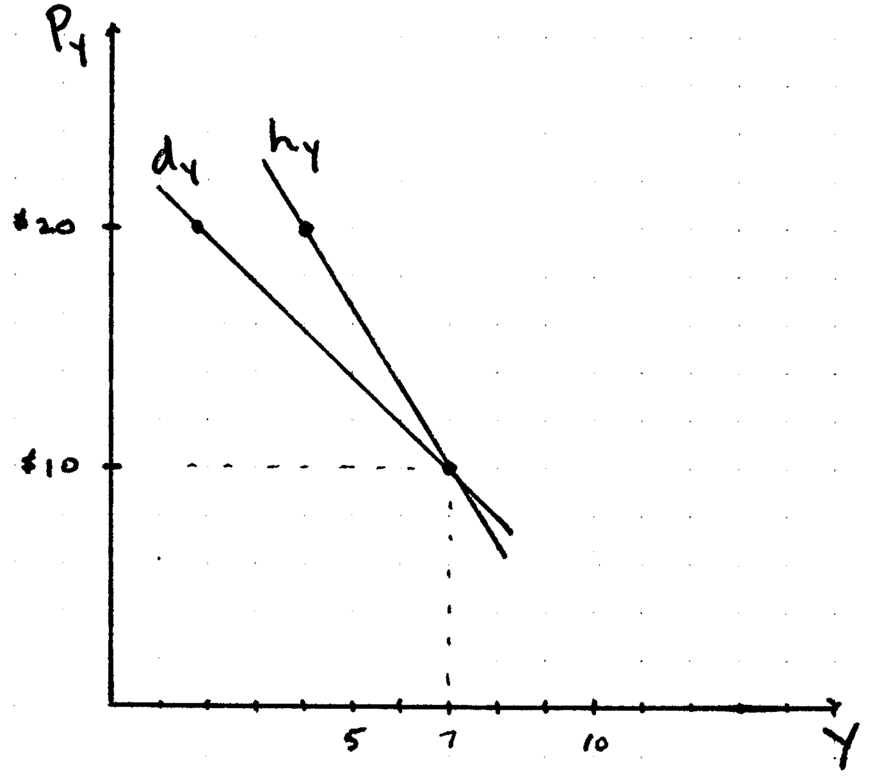
so $\frac{dX}{dP_Y} > 0$, since both right-hand side terms are positive

(d) see attached diagram (10 pts)

(e) see diagram. (10 pts)

Note that Marshallian demand curve has $Y = 7$ when $P_Y = \$10$ and $Y = 1.8$ when $P_Y = \$20$. $Y = 1.8$ is arbitrary, but is consistent with adjoining diagram. Hicksian demand curve has $Y = 7$ when $P_Y = \$10$ and $Y = 5$ when $P_Y = \$20$. $Y = 5$ is arbitrary, but must be greater than value of Y on the Marshallian demand curve.


Y
12
11
10
9
8
7
6
5
4
3
2
1
1
2
3
4
5
6
7
8
9
10
11
12
X
(b)
(d)
(d)
U_0
U_1
Subst.
Inc.
TOTAL


P_Y
d_Y
h_Y
$20
$10
5
7
10
Y

(25 pts.) 6. $u(X,Y) = -X^{-1} - Y^{-1}$

(a) $mu_x = \frac{du}{dX} = X^{-2}$ (5 pts)

$$\frac{d\,mu_x}{dX} = \frac{d^2u}{dX^2} = -2X^{-3} < 0$$

so diminishing marginal utility.

(b) $\mathcal{L} = -X^{-1} - Y^{-1} + \lambda(I - P_x \cdot X - P_Y \cdot Y)$ (15 pts)

1st order conditions for max:

$$\left.\begin{aligned} \frac{d\mathcal{L}}{dX} &= \frac{1}{X^2} - \lambda P_x = 0 \\ \frac{d\mathcal{L}}{dY} &= \frac{1}{Y^2} - \lambda P_Y = 0 \end{aligned}\right\} \quad \frac{Y^2}{X^2} = \frac{P_x}{P_Y}$$

$$\frac{d\mathcal{L}}{d\lambda} = I - P_x X - P_Y Y = 0$$

$$Y = X P_x^{1/2} P_Y^{-1/2}$$

$$I - P_x X - P_Y(X P_x^{1/2} P_Y^{-1/2}) = 0$$

$$P_x X + P_Y^{1/2} P_x^{1/2} X = I$$

$$X^* = I / (P_x + P_x^{1/2} P_Y^{1/2})$$

and $Y^* = I / (P_Y + P_x^{1/2} P_Y^{1/2})$

(c) $X = I / (P_x + P_x^{1/2} P_Y^{1/2})$ (5 pts)

suppose I, P_x, and P_Y change by a multiple t:

$$f(tP_x, tP_Y, tI = \frac{tI}{tP_x + (tP_x)^{1/2}(tP_Y)^{1/2}}$$

$$f(\cdot) = \frac{t\,I}{t(P_x + P_x^{1/2} P_Y^{1/2})} = \frac{I}{P_x + P_x^{1/2} P_Y^{1/2}} = X$$

so demand for X is homogeneous of degree zero in prices and income.