

Ec150
Answers to Midterm #1 Review

Multiple choice.

1.

$$P_L X_L + P_T X_T = I$$

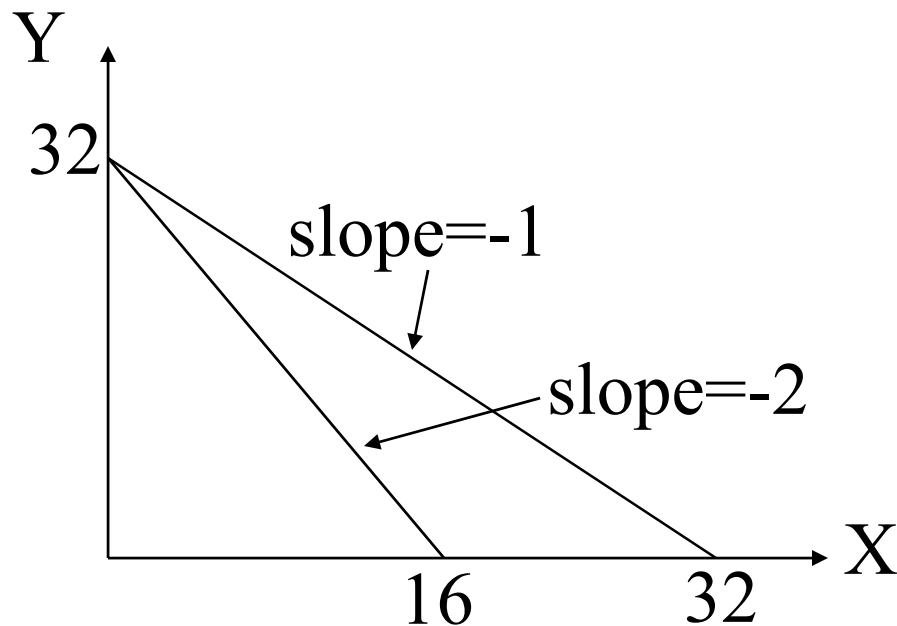
$$\frac{\Delta X_L}{\Delta X_T} = \frac{30 - 6}{8 - 14} = -4 = -\frac{P_T}{P_L} = -\frac{P_T}{6} \rightarrow P_T = 24$$

$$\therefore 6(30) + 24(8) = 372 = I$$

$$2. \quad Y = \frac{I}{P_Y} - \frac{P_x}{P_y} X$$

$$20 = \frac{I}{P_Y} - 2(6) \rightarrow \frac{I}{P_Y} = 32$$

$$Y = \frac{I(2)}{P_y(2)} - \frac{P_x}{P_Y(2)} X \rightarrow 20 = 32 - (1)X \rightarrow X = 12$$

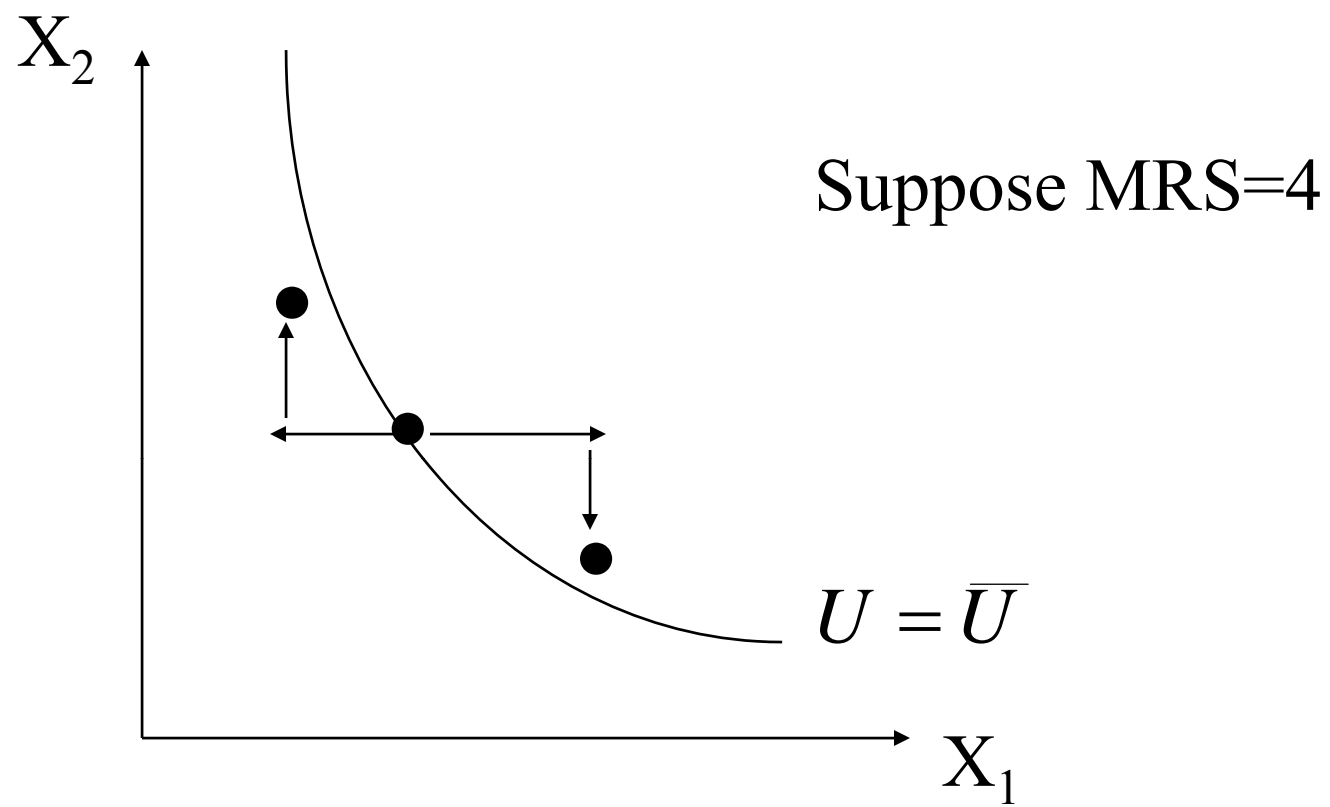


3.

$$\frac{\Delta B}{\Delta A} = -\frac{P_A}{P_B} = -\frac{6}{3} = -2 \rightarrow \Delta B = -2\Delta A$$

$$\text{If } \Delta A = 2 \rightarrow \Delta B = -2(2) = -4$$

4.



5.

$$\text{Ray: } Y = \frac{3}{2}X$$

$$\text{Possible utility functions: } U = \min\left(\frac{X}{2}, \frac{Y}{3}\right)$$

$$U = \min\left(\frac{3}{2}X, Y\right)$$

$$U = \min\left(X, \frac{2}{3}Y\right)$$

(or any monotonic transformations of these functions)

Problems.

1. v.i: $\frac{I}{P_y} = \frac{40}{1} = 40 \rightarrow (X, Y) = (0, 40)$

h.i.: $.50\bar{X} + .80\hat{X} = 40$

$$.50(12) + .80\hat{X} = 40$$

$$\rightarrow \hat{X} = 42.5$$

$$\therefore X = \bar{X} + \hat{X} = 12 + 42.5 = 54.5$$

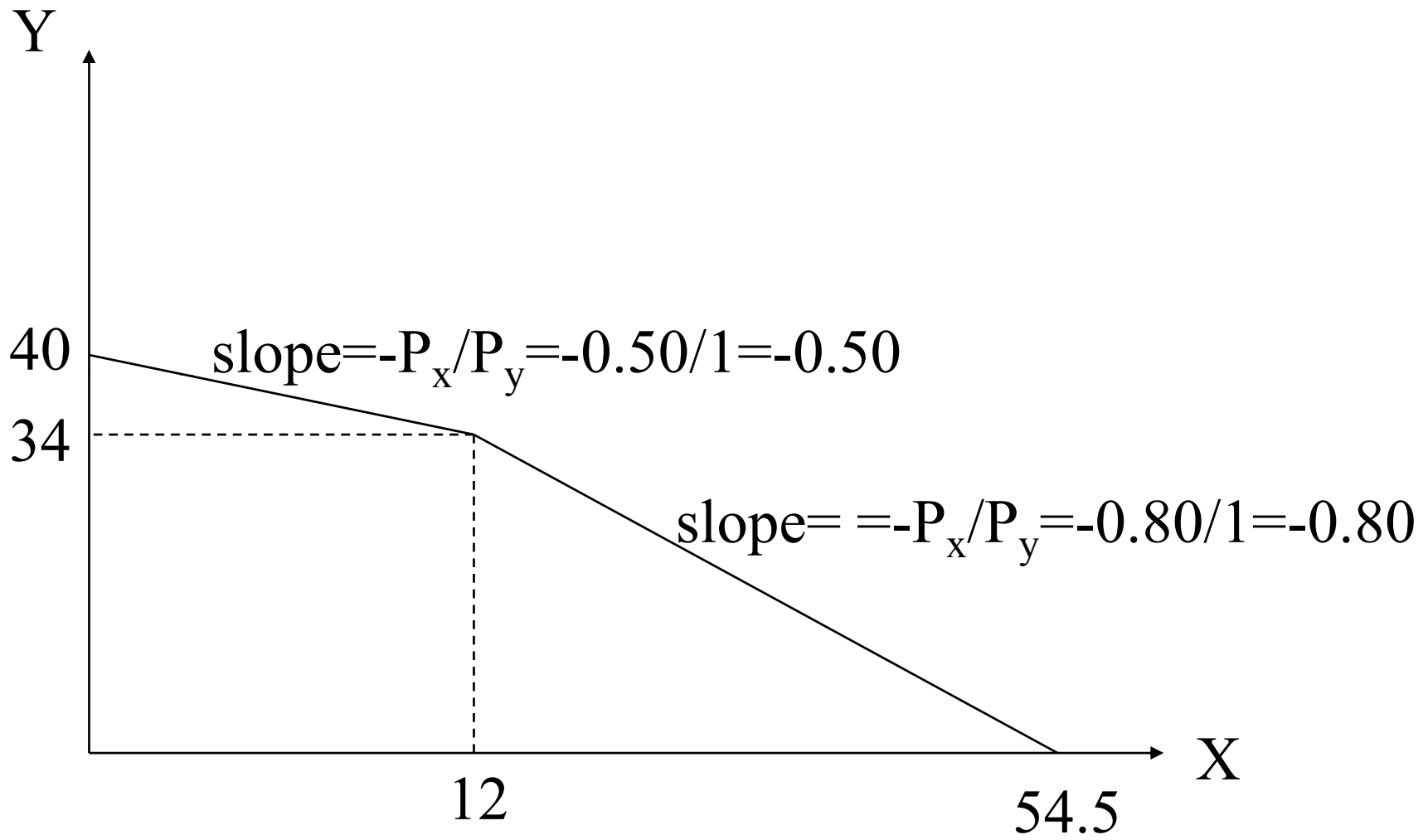
$$\rightarrow (X, Y) = (54.5, 0)$$

kink: when $X=12$

$$.50X + Y = 40$$

$$.50(12) + Y = 40$$

$$\rightarrow Y = 34 \therefore (X, Y) = (12, 34)$$



2. Jim's utility function:

$$U=XY$$

$$MRS = \frac{MU_x}{MU_y} = \frac{Y}{X}$$

Consider the following bundles:

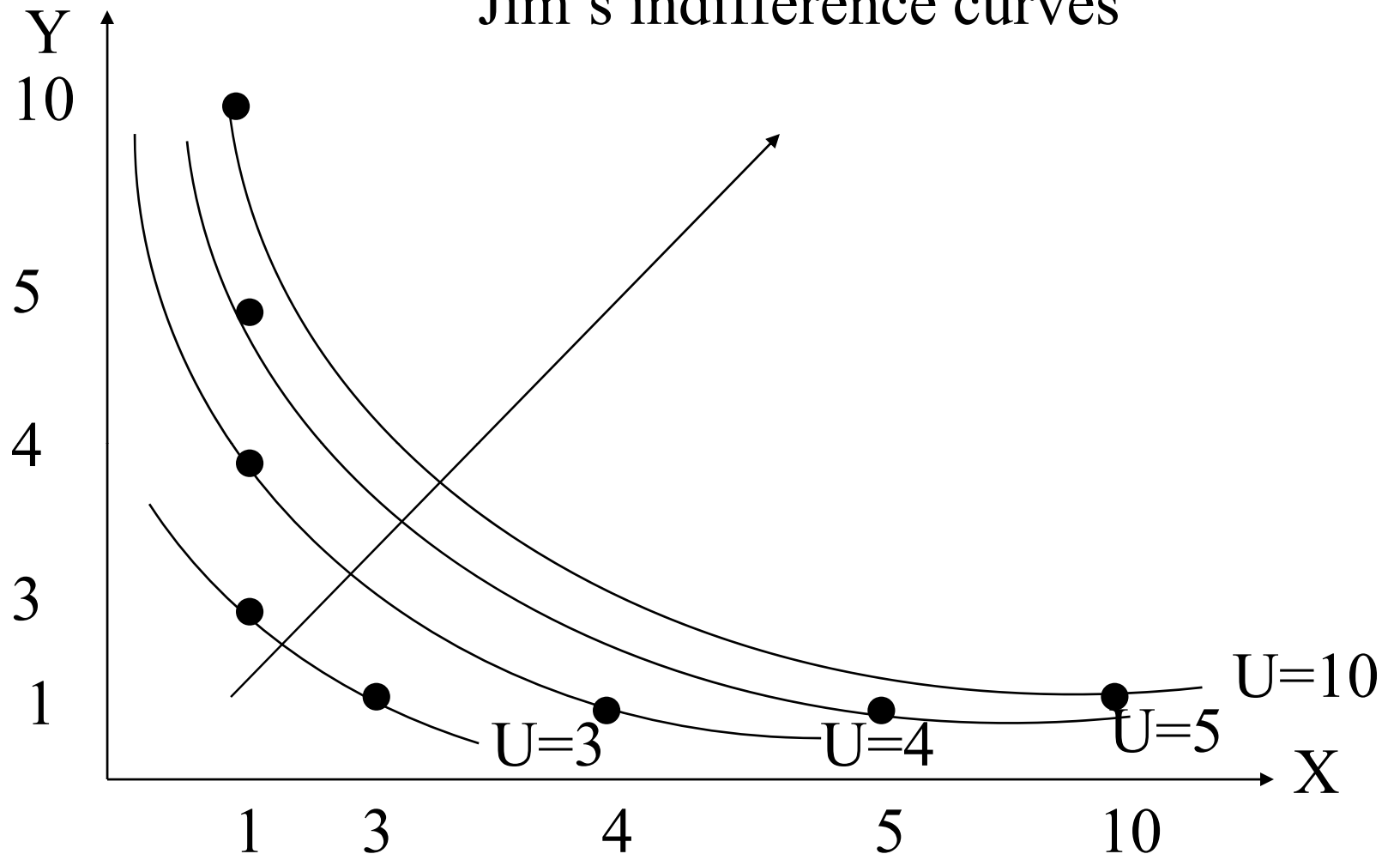
U=3	
X	Y
1	3
3	1

U=4	
X	Y
1	4
2	2
4	1

U=5	
X	Y
5	1
1	5

U=10	
X	Y
1	10
2	5
5	2
10	1

Jim's indifference curves



Jerry's utility function:

$$U=(XY+1)^2$$

$$MRS = \frac{MU_x}{MU_y} = \frac{2(XY+1)Y}{2(XY+1)X} = \frac{Y}{X}$$

(Notice the slope at any point (X,Y) is the *same* as Jim's)

Consider the following bundles:

U=16

X	Y
1	3
3	1

U=25

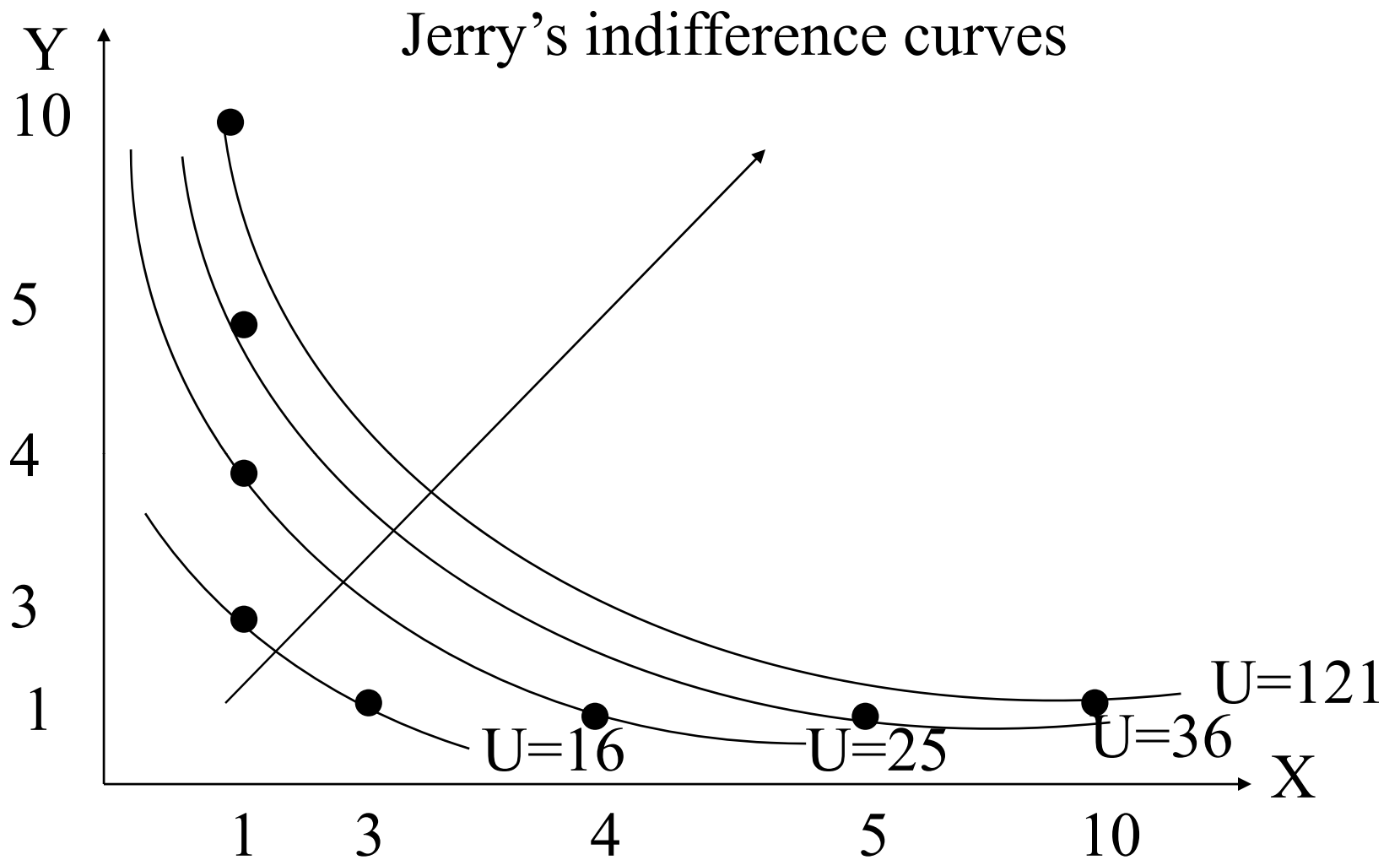
X	Y
1	4
2	2
4	1

U=36

X	Y
5	1
1	5

U=121

X	Y
1	10
2	5
5	2
10	1



Same indifference curves and preferences as Jim.

Oral's utility function:

$$U = (XY - 4)^2$$

$$MRS = \frac{MU_x}{MU_y} = \frac{2(XY - 4)Y}{2(XY - 4)X} = \frac{Y}{X}$$

(Notice the slope at any point (X,Y) is the *same* as Jim's)

Consider the following bundles:

U=1

X	Y
1	3
3	1

U=0

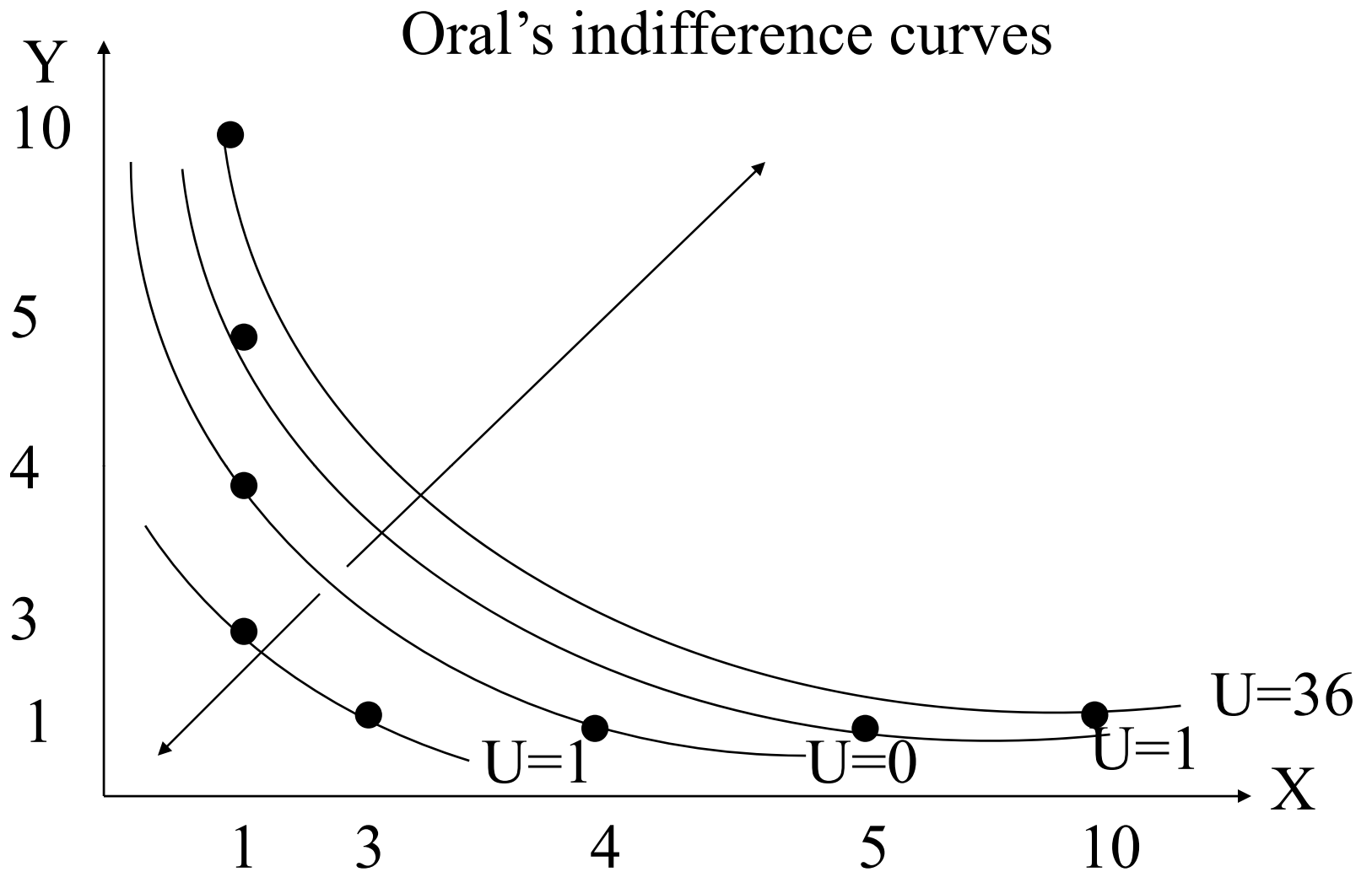
X	Y
1	4
2	2
4	1

U=1

X	Y
5	1
1	5

U=36

X	Y
1	10
2	5
5	2
10	1



Same indifference curves but different preferences than Jim.

The following situation would give rise to a set of indifference curves similar to Oral's.

Consider an individual wishing to rent an apartment in Toronto. The axes represent north and east directions in kms. Points along $U=0$ represent various locations along 'main-street downtown'. Points further outward and inward represent movements away from downtown. This individual prefers to rent an apartment away from main-street downtown. In fact, the further away this individual is located from downtown, the better off the individual is.

Pat's utility function:

$$U=(XY+1)(XY)$$

$$MRS = \frac{MU_x}{MU_y} = \frac{2(XY)Y + Y}{2(XY)X + X}$$

(Though the equation for MRS looks different than Jim's, the slope at any point (X,Y) – and here you need to plug in actual values to see this - is the *same* as Jim's)

Consider the following bundles:

U=12

X	Y
1	3
3	1

U=20

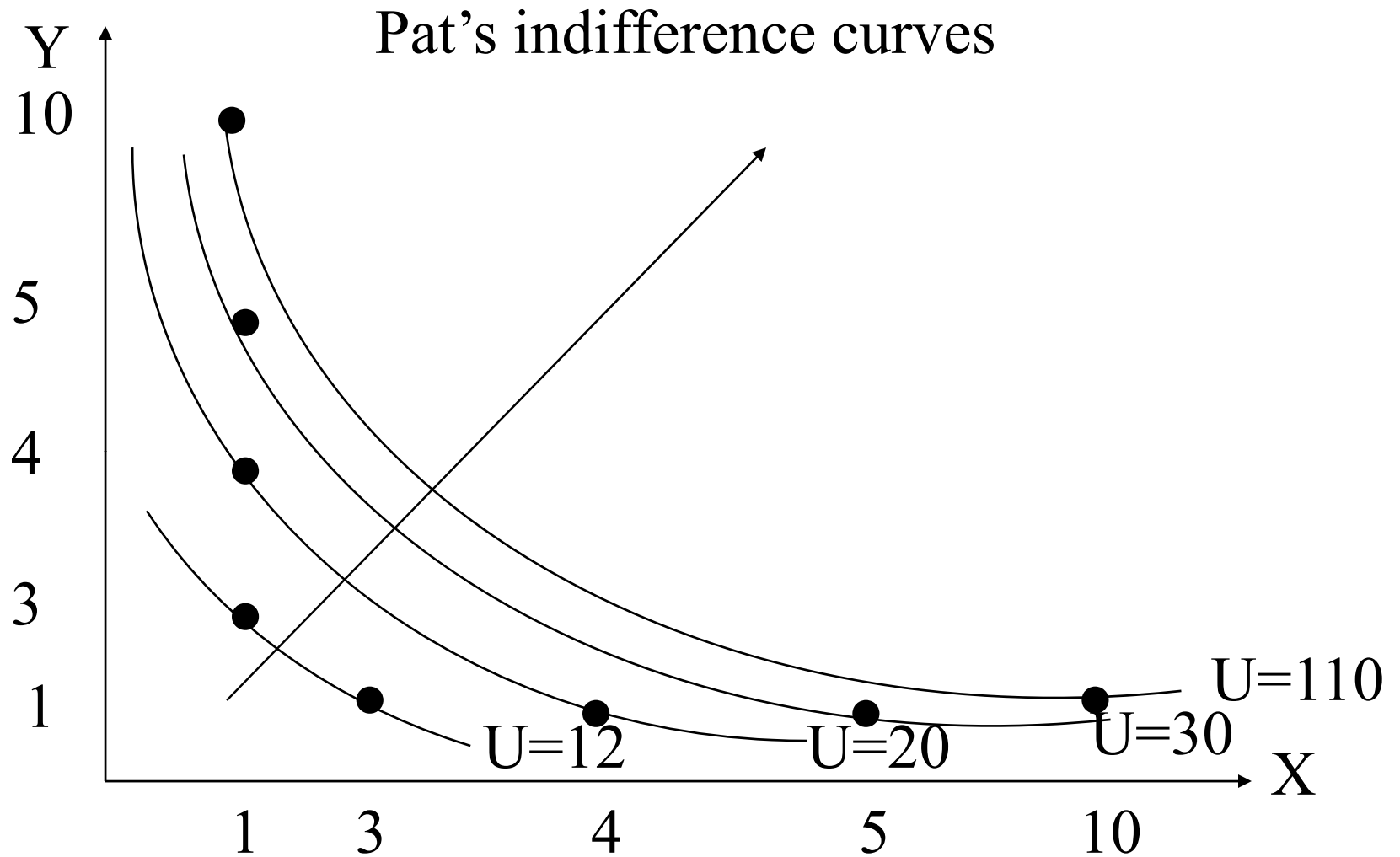
X	Y
1	4
2	2
4	1

U=30

X	Y
5	1
1	5

U=110

X	Y
1	10
2	5
5	2
10	1



Same indifference curves and preferences as Jim.

Francis's utility function:

$$U = 1/(XY+1) = (XY+1)^{-1}$$

$$MRS = \frac{MU_x}{MU_y} = \frac{-(XY+1)^{-2} Y}{-(XY+1)^{-2} X} = \frac{Y}{X}$$

(Notice the slope at any point (X,Y) is the *same* as Jim's)

Consider the following bundles:

U=1/4

X	Y
1	3
3	1

U=1/5

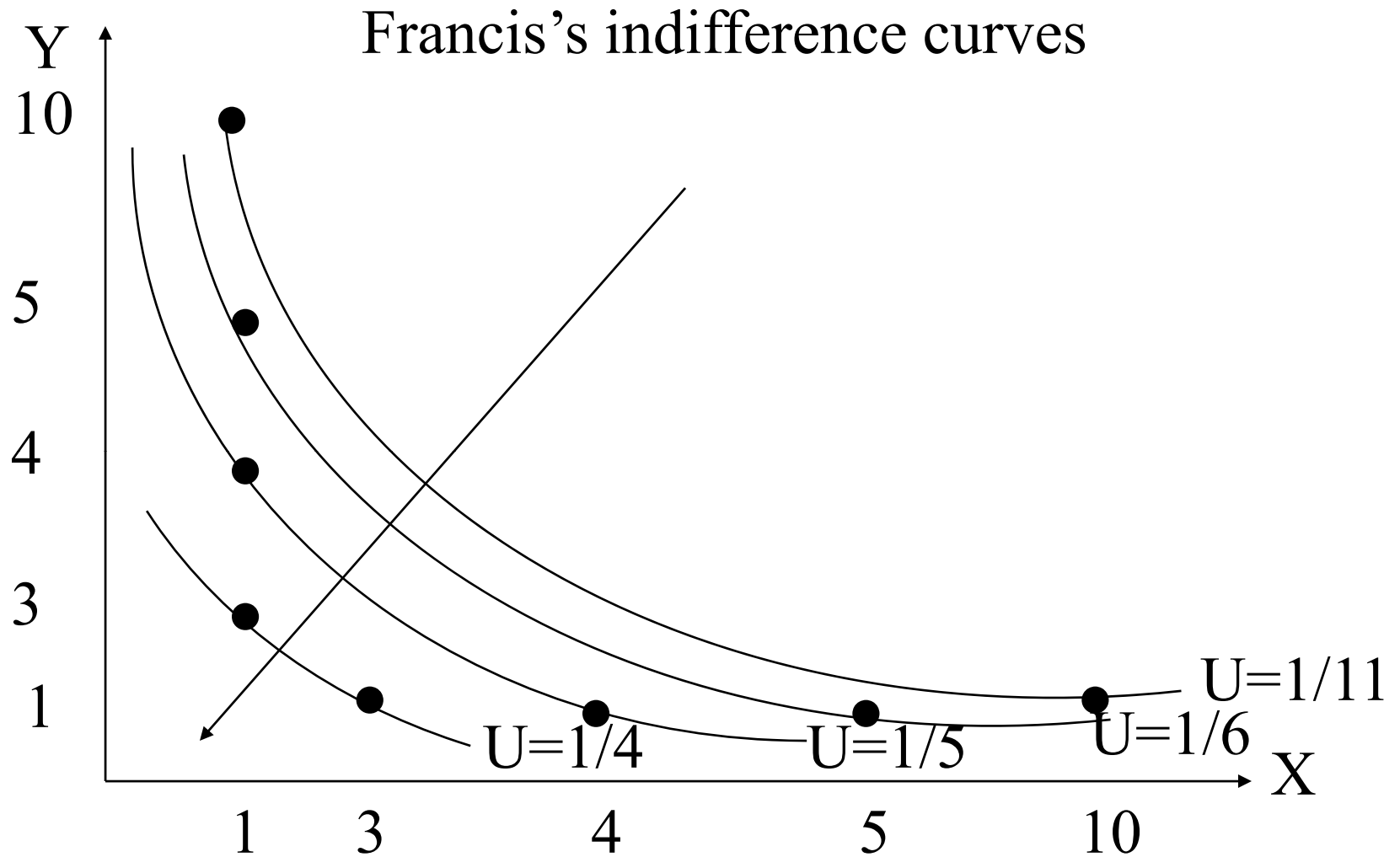
X	Y
1	4
2	2
4	1

U=1/6

X	Y
5	1
1	5

U=1/11

X	Y
1	10
2	5
5	2
10	1



Same indifference curves but different preferences than Jim.

Adam's utility function:

$$U = XY + X$$

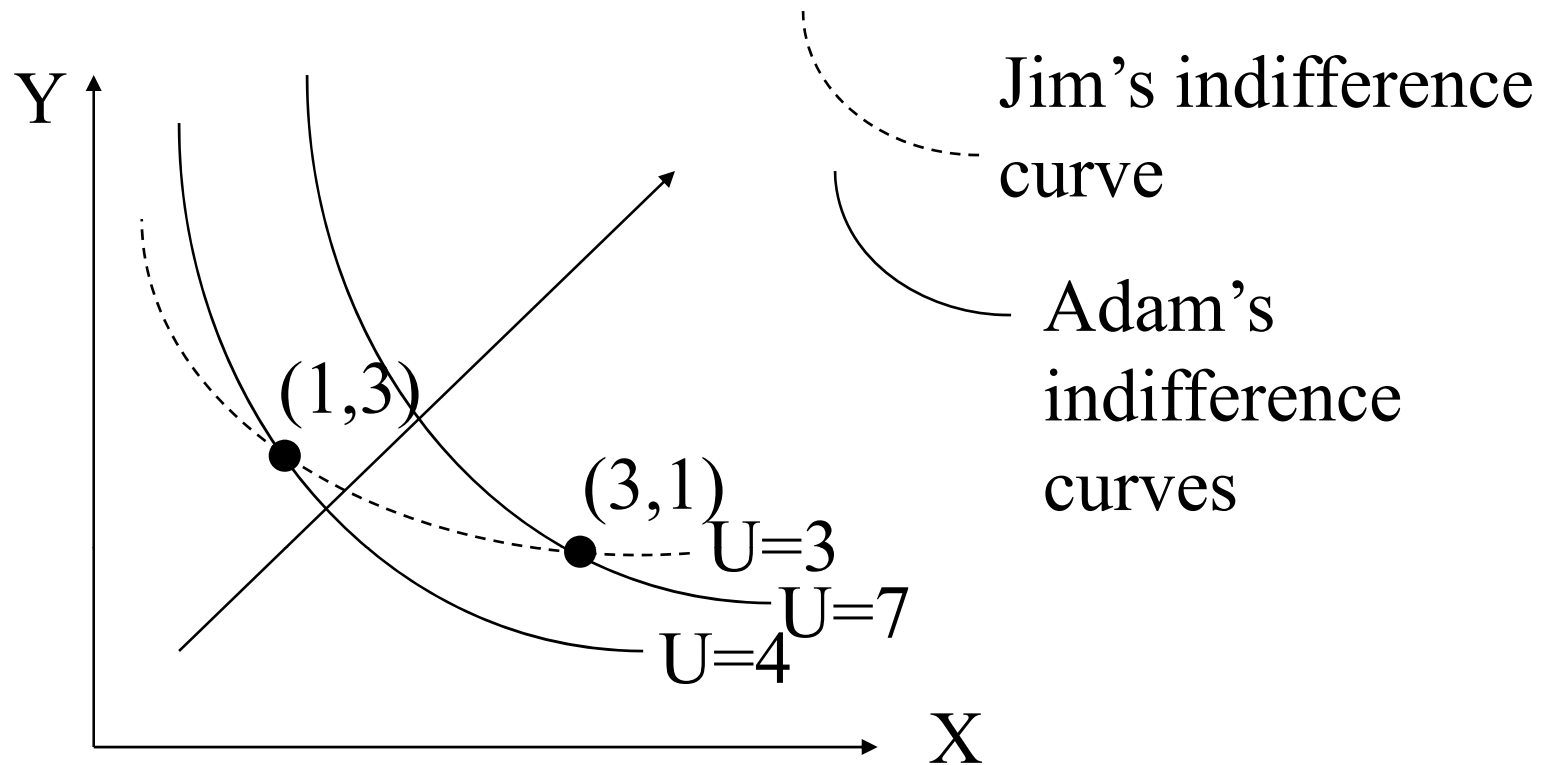
$$MRS = \frac{MU_x}{MU_y} = \frac{Y + 1}{X}$$

(Notice the slope at any point (X, Y) is *different* than Jim's)

Consider the following bundles:

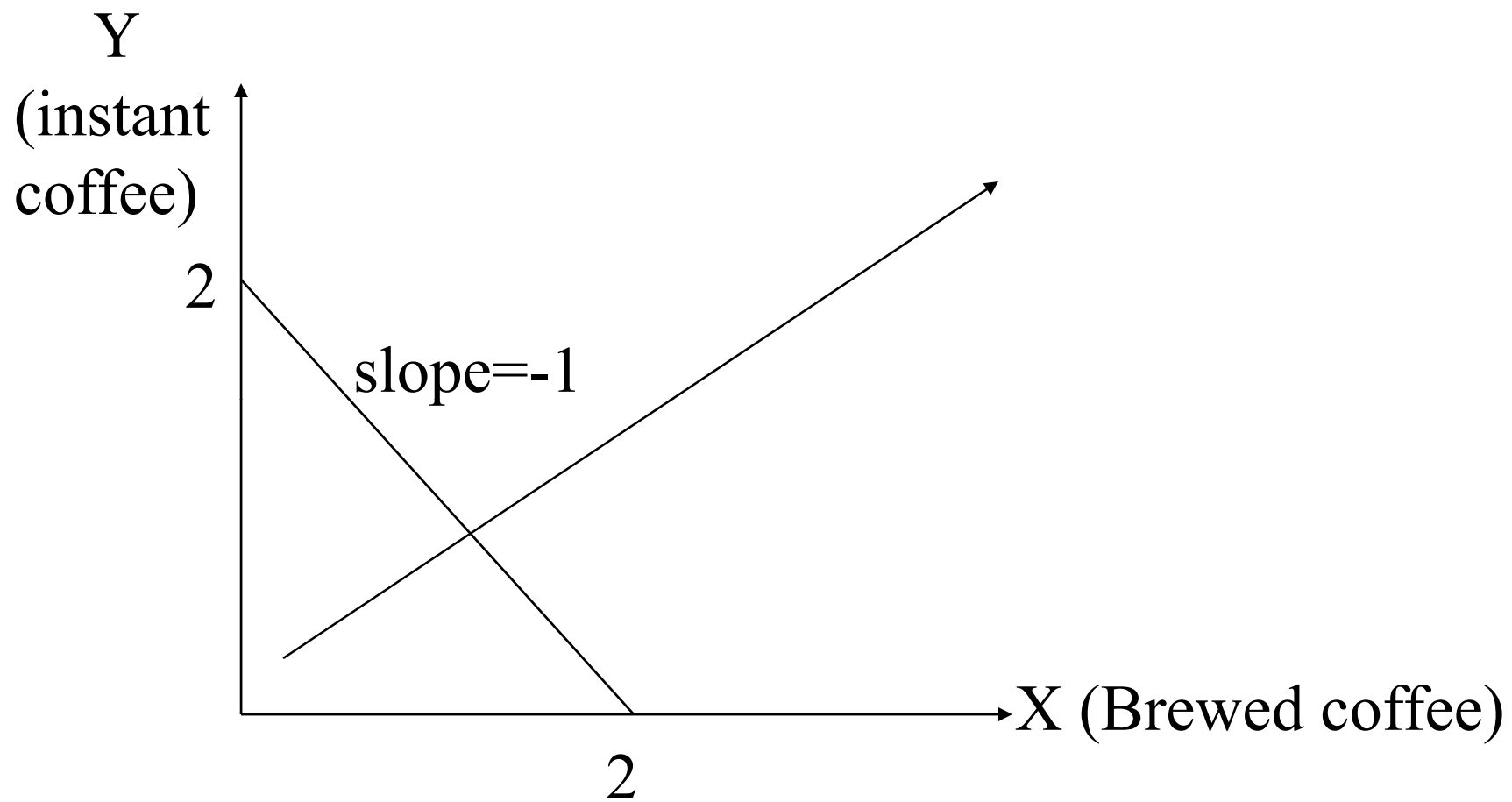
X	Y	U	X	Y	U	X	Y	U	X	Y	U
1	3	4	1	4	5	5	1	10	1	10	11
3	1	7	2	2	6	1	5	6	2	5	12
			4	1	8				5	2	15
									10	1	20

(Notice that bundles on a given indifference curve for Jim now lie on *different* indifference curves for Adam – bundles which Jim considered to be equally preferred are considered by Adam as not being equally preferred)



Different indifference curves *and* preferences than Jim.

3.a.



3.b.

