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9.5/10

Homework #1
Intermediate Microeconomics
W3211.001

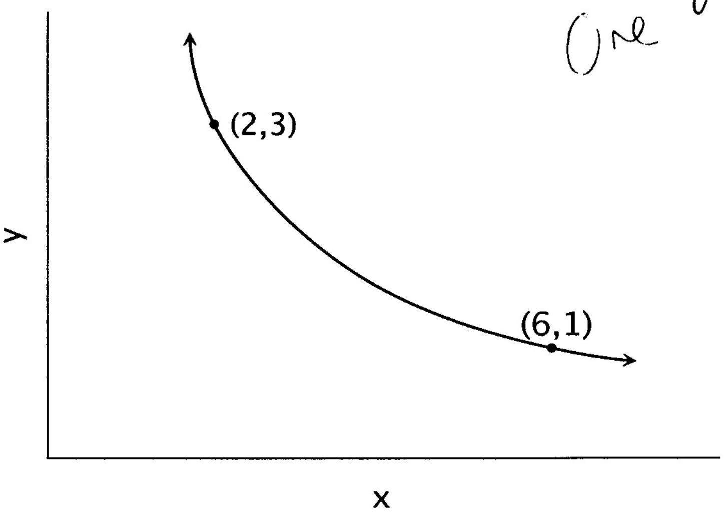
Question 1

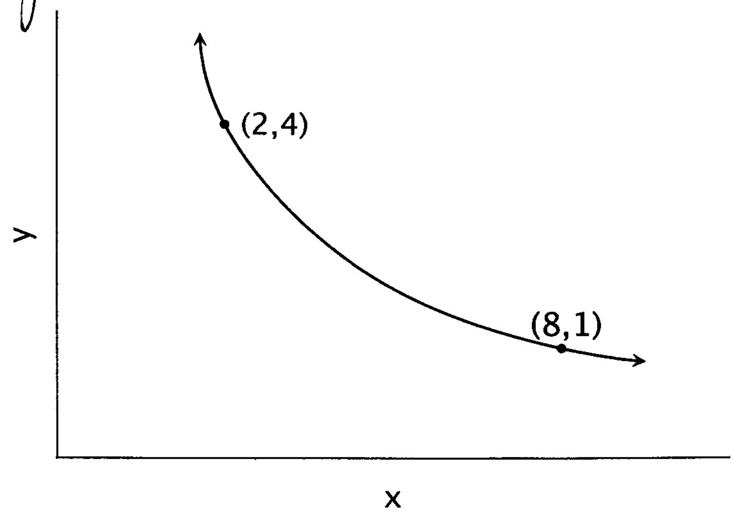
1a)

$$U(2,3) = 6 = xy$$
$$y = \frac{6}{x}$$

$$U(2,4) = 8 = xy$$
$$y = \frac{8}{x}$$

One Diagram





$$MRS(x,y) = \frac{dy}{dx} = \frac{\frac{\partial u}{\partial x}}{\frac{\partial u}{\partial y}} = \frac{y}{x}$$

$$MRS(2,3) = \frac{3}{2}$$

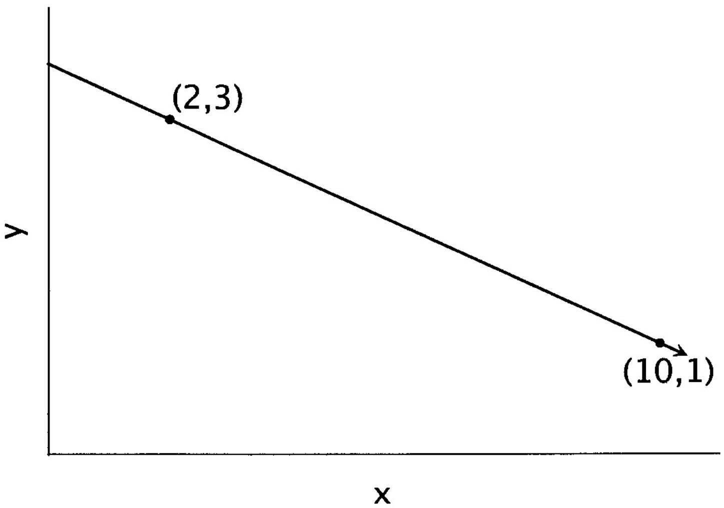
$$MRS(2,4) = 2$$

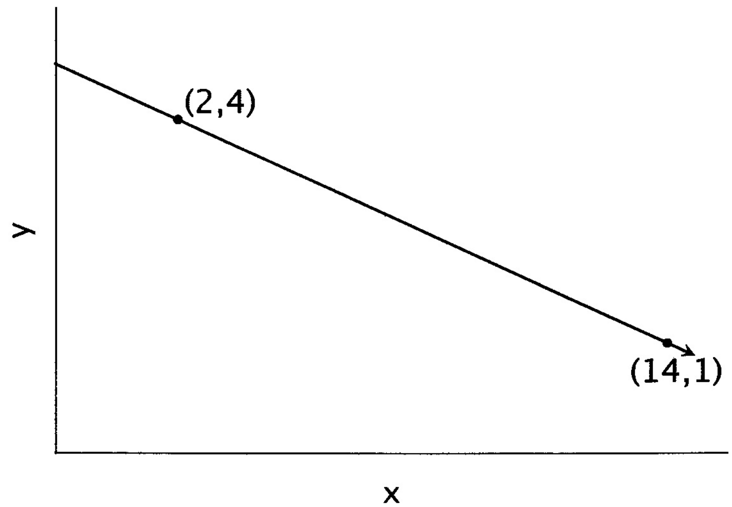
Strictly decreasing

1b)

$$U(2,3) = x + 4y = 14$$
$$4y = 14 - x$$
$$y = 3.5 - \frac{x}{4}$$

$$U(2,4) = x + 4y = 18$$
$$4y = 18 - x$$
$$y = 4.5 - \frac{x}{4}$$





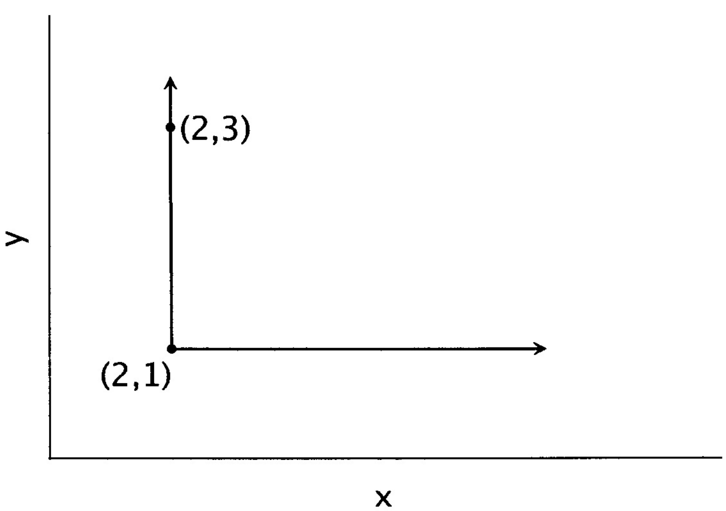
$$MRS(x,y) = \frac{dy}{dx} = \frac{\frac{\partial u}{\partial x}}{\frac{\partial u}{\partial y}} = \frac{1}{4}$$
$$MRS(2,3) = MRS(2,4) = \frac{1}{4}$$

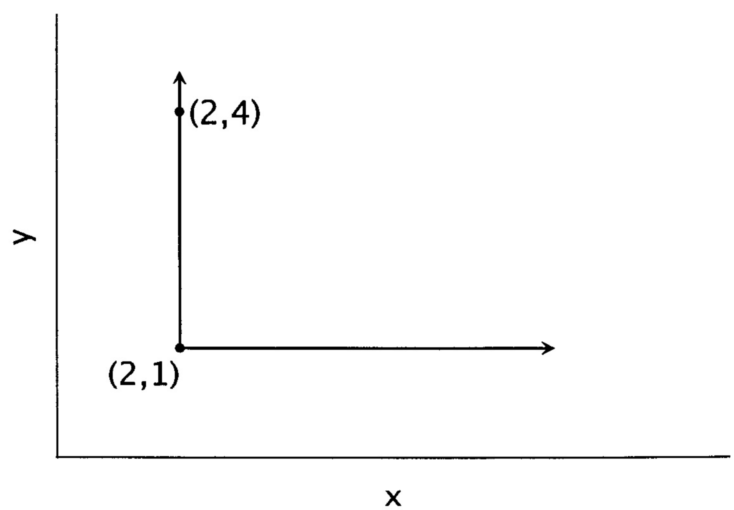
Strictly decreasing

1c)

$$U(2,3) = min[2x, 4y] = min[4, 12] = 4$$

$$U(2,4) = min[2x, 4y] = min[4, 16] = 4$$





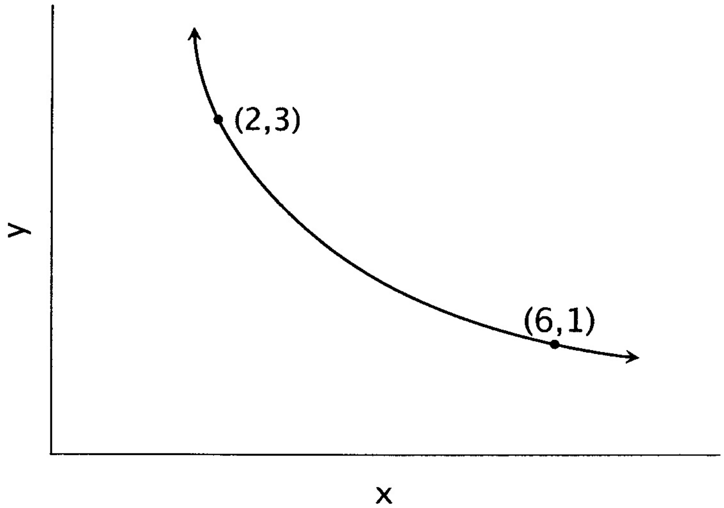
Cannot compute MRS at (2,3), (2,4), or any other point.

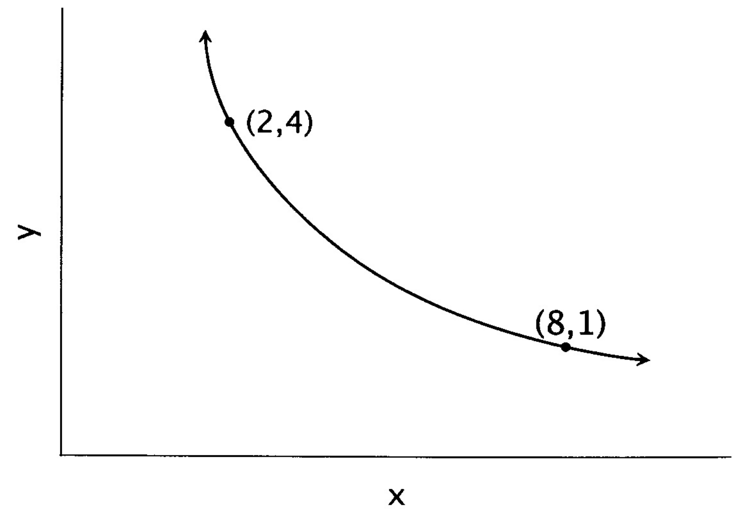
technically 0 or (x,1) where x>2

1d)

$$U(2,3) = \ln x + \ln y + 12 = \ln 2 + \ln 3 + 12$$
$$\ln(xy) = \ln 6$$
$$y = \frac{6}{x}$$

$$U(2,3) = \ln x + \ln y + 12 = \ln 2 + \ln 4 + 12$$
$$xy = 8$$
$$y = \frac{8}{x}$$





$$MRS(x,y) = \frac{dy}{dx} = \frac{\frac{\partial u}{\partial x}}{\frac{\partial u}{\partial y}} = \frac{\frac{1}{x}}{\frac{1}{y}} = \frac{y}{x}$$

$$MRS(2,3) = \frac{3}{2}$$

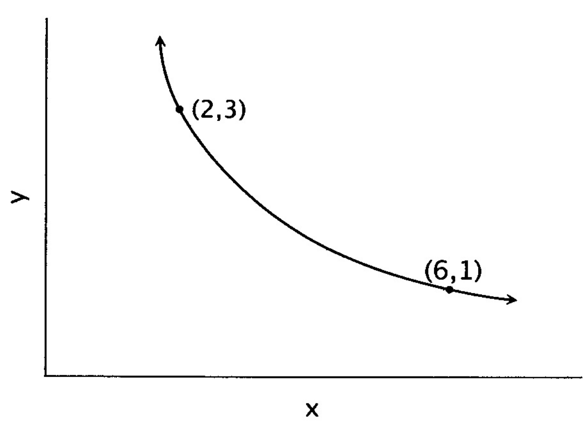
$$MRS(2,4) = 2$$

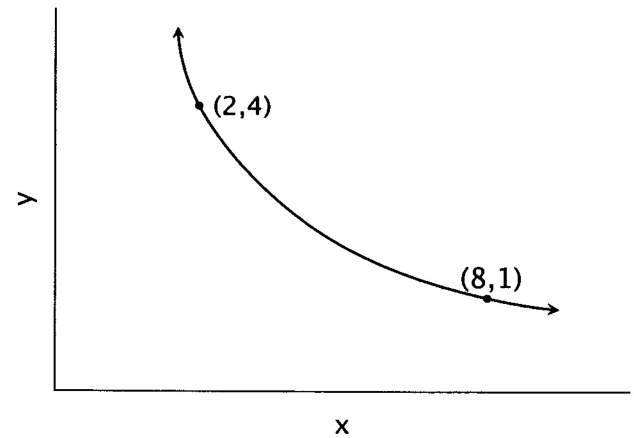
Strictly decreasing

1e)

$$U(2,3) = 5xy + 7 = 37$$
$$xy = 6$$
$$y = \frac{6}{x}$$

$$U(2,4) = 5xy + 7 = 47$$
$$xy = 8$$
$$y = \frac{8}{x}$$





$$MRS(x,y) = \frac{dy}{dx} = \frac{\frac{\partial u}{\partial x}}{\frac{\partial u}{\partial y}} = \frac{5y}{5x} = \frac{y}{x}$$

$$MRS(2,3) = \frac{3}{2}$$

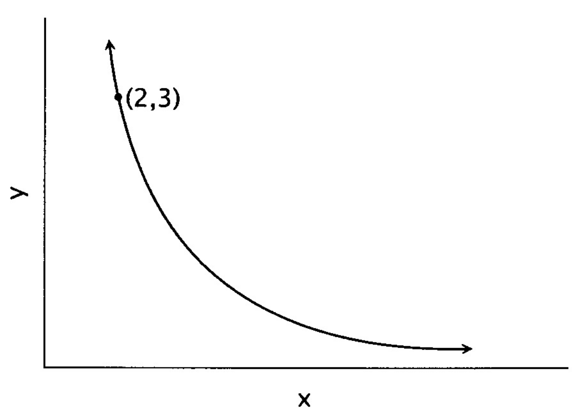
$$MRS(2,4) = 2$$

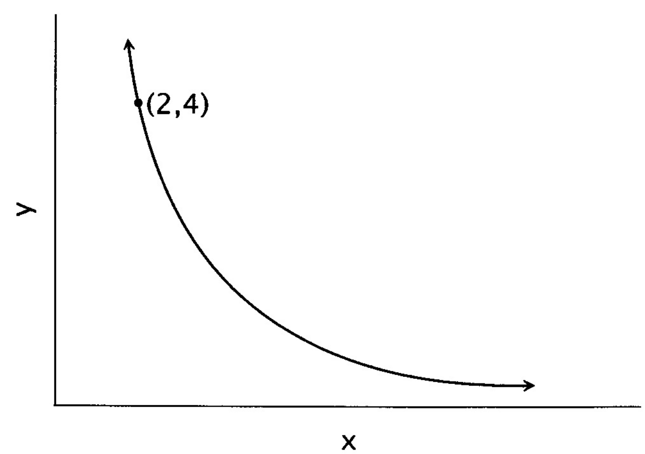
Strictly decreasing

1f)

$$U(2,3) = 2x + \ln y = 4 + \ln 3$$
$$\ln y = -2x + 4 + \ln 3$$
$$y = 3e^{4-2x}$$

$$U(2,4) = 2x + \ln y = 4 + \ln 4$$
$$\ln y = -2x + 4 + \ln 4$$
$$y = 4e^{4-2x}$$





$$MRS(x,y) = \frac{dy}{dx} = \frac{\frac{\partial u}{\partial x}}{\frac{\partial u}{\partial y}} = \frac{2}{\frac{1}{y}} = 2y$$

$$MRS(2,3) = 6$$

$$MRS(2,4) = 8$$

Strictly decreasing

Question 2

a) The curves are identical.

b) All of the curves have the same MRS at all of their respective points, meaning that they are parallel lines.

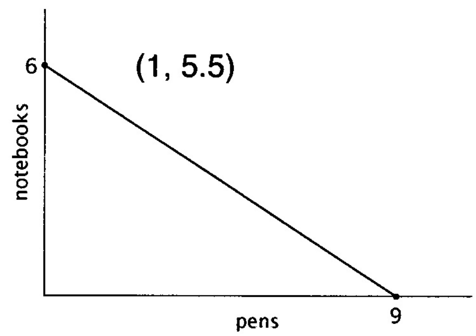
c) The MRS does not vary with x. As you vary x, the indifference curves are simply shifted in x.

d) $MRS = \left|-\frac{y}{x}\right| = a$. The MRS does not vary with *y* or *x* while moving along a line *y* = *ax*. Because a), d), and e) have identical indifference curves and formulas for the MRS, this implies that the MRS would not vary with y or x on a line going through the origin in graphs d) and e) as well as in graph a).

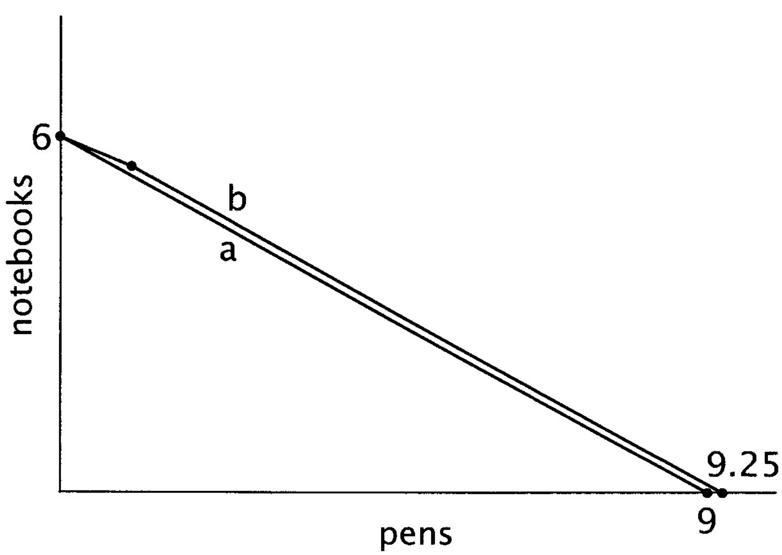
Question 3

3a)

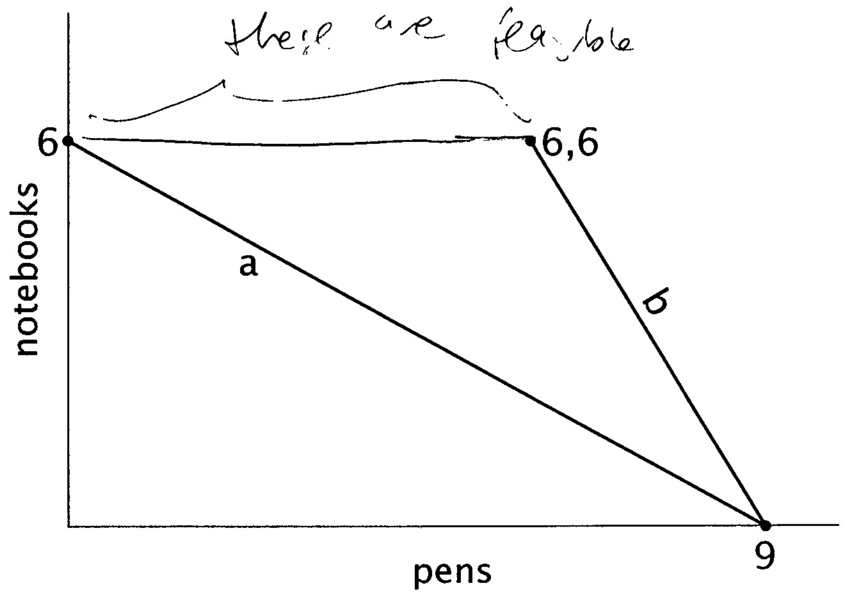
Opportunity cost of package of pens = 2/3 notebook



3b)



3c) -1/2

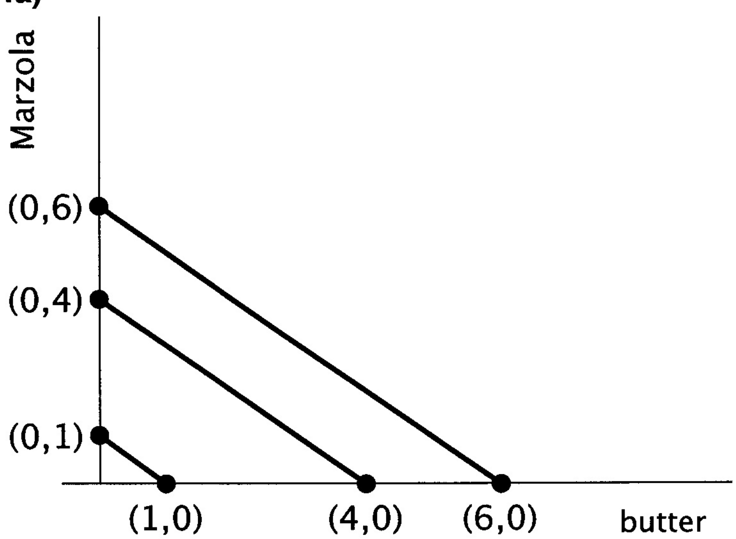


Opportunity cost of pens = 2 notebooks

op cost of pens < 6

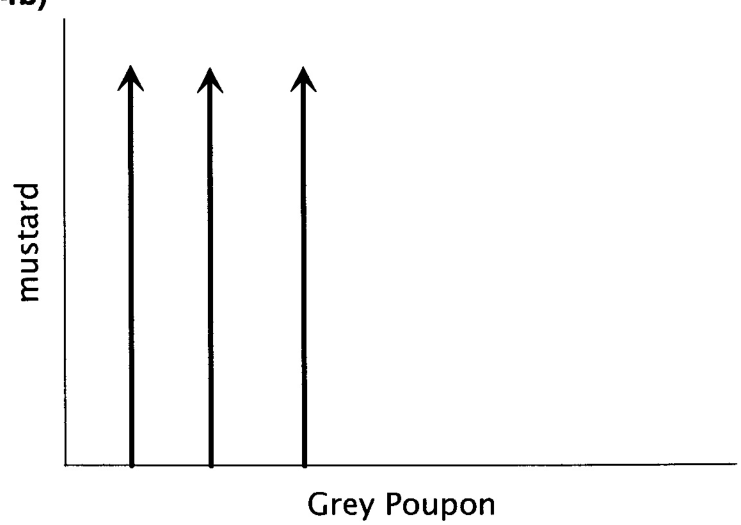
Question 4

4a)



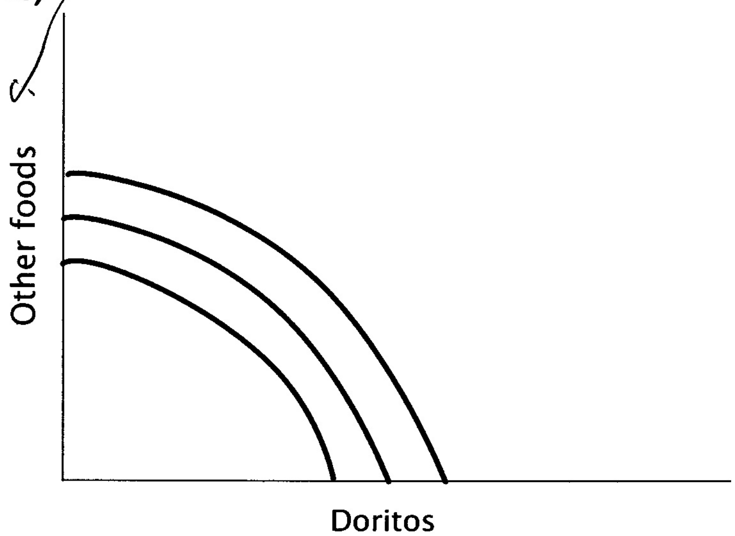
If Marzola is just as good as butter, we are indifferent to giving up one for the other. Thus, all indifference curves will just have a slope of negative one.

4b)



If you will have no other mustard by Grey Poupon, then it does not matter how much of the other mustard you have. Thus, the indifference curve is just a vertical line.

4c)



Because Ranch Style Doritos (x-axis) are addictive, this means that the more Ranch Style Doritos one has, the more one wants. This means that, counter to the usual, the MRS increases as one has more Ranch Style Doritos. Graphically, this means that the slope of the graph becomes more negative as x increases.