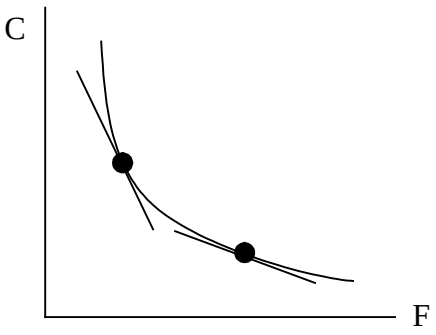
Chapter 3

Preferences and Utility: Assignment Solutions

Question 2

a) $MRS_{F,C} = \frac{MU_F}{MU_C}$

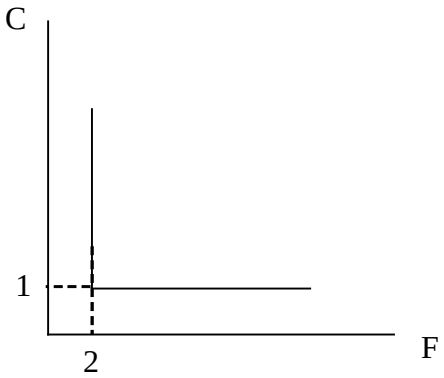
b)



The marginal rate of substitution is measured as the absolute value of the slope of a line tangent to the indifference curve. As can be seen in the graph above, this slope becomes less negative as we move down the indifference curve, implying a diminishing MRS.

c) Perfect substitutes

d) Perfect complements



Question 4

b) He would stop consuming once his marginal utility is 0. If he continues, his total utility will decline.

$MU_S = 10 - 2S = 0$

$S = 5$

Question 5

a) Yes, since MU_x and MU_y are always positive.

b) No, since $\frac{\partial MUx}{\partial x} = 0$ and $\frac{\partial MUy}{\partial y} = 0$.

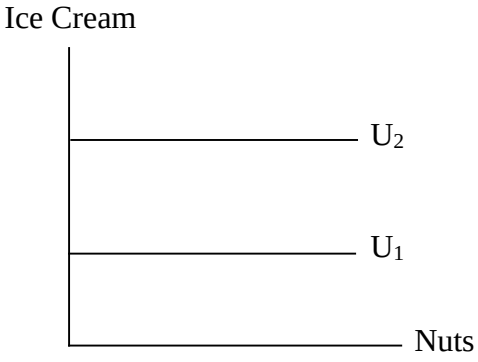
Question 6

a) Yes, since MU_x and MU_y are always positive.

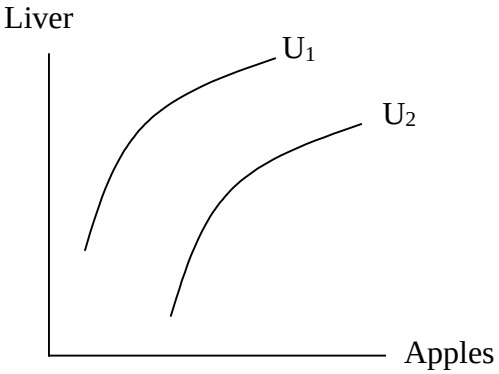
b) No, since $\frac{\partial MUx}{\partial x} = 0$ and $\frac{\partial MUy}{\partial y} = 2x$.

Question 7

d)

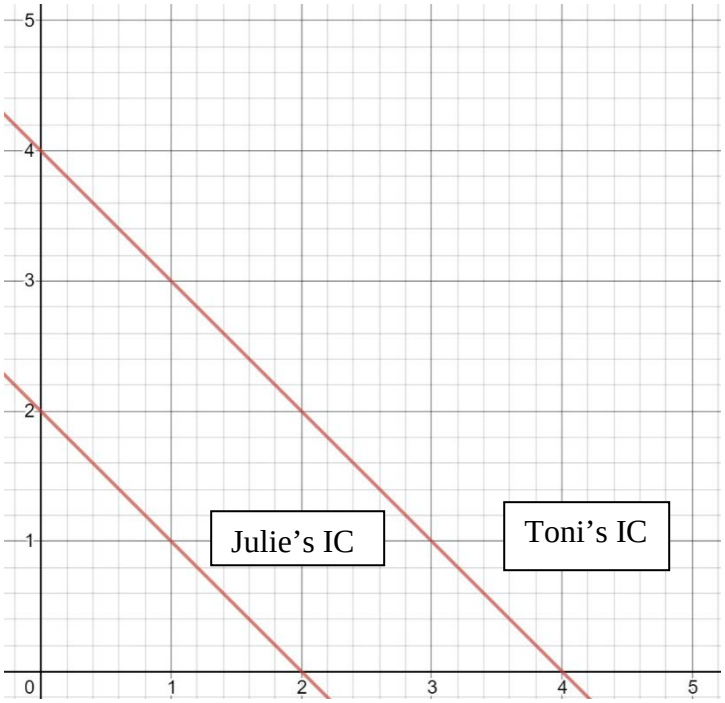


e)



Question 8

a)



Question 13

a) Yes, since MU_x and MU_y are always positive.

b) Constant, since $\frac{\partial MUx}{\partial x} = 0$

c) $MRS_{x,y} = 3$

d) The $MRS_{x,y}$ remains constant moving along the indifference curve as $\frac{\partial MRSxy}{\partial x} = 0$

Question 14

a) Yes, since MU_x and MU_y are always positive.

b) $\frac{\partial MUx}{\partial x} = (\alpha - 1)Ay^{\beta}x^{\alpha-2}$

When $\alpha < 1$, $\frac{\partial MUx}{\partial x}$ is negative, diminishing marginal utility.

When $\alpha = 1$, $\frac{\partial MUx}{\partial x}$ is 0, constant marginal utility.

When $\alpha > 1$, $\frac{\partial MUx}{\partial x}$ is positive, increasing marginal utility.

c) $MRS_{xy} = \frac{\alpha y}{\beta x}$

d) Diminishing marginal rate of substitution of x for y as $\frac{\partial MRSxy}{\partial x} = \frac{-\alpha y}{\beta x^2}$ which is negative.

Question 15

a) Yes, since MU_x and MU_y are always positive.

b) $\frac{\partial MUx}{\partial x} = -\frac{1}{2x^{3/2}}$ is negative. Marginal utility of x is diminishing.

c) $MRS_{xy} = \frac{1}{\sqrt{x}}$

d) $\frac{\partial MRSxy}{\partial x} = -\frac{1}{2x^{3/2}}$ is negative. As the consumer substitutes x for y, the MRS_{xy} will diminish.

f) The slope of a indifference curve at some basket (x,y) is the -MRS_{xy}. At x=4 the slope of an indifference curve is -0.5. As there is no y appear in the slope equation, any indifference curves at x=4 will have the value equal to -0.5.

Question 17

MRS_{FC} = 2

Question 18

$MRS_{xy} = \frac{x^{\rho-1}}{y^{\rho-1}}$. Because ρ is less 1. As we sliding down along the indifference curve, x increases, the numerator decreases. And when y decreases, the denominator increases. Therefore, MRS_{xy} falls as the consumer substitute x for y, this utility function exhibits diminishing marginal rate of substitution of x for y.