Name: Answer key Student #: _____

UNIVERSITY OF WESTERN ONTARIO
LONDON ONTARIO
ECONOMICS 2150a-001/002
MIDTERM #1
Version 111

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INSTRUCTIONS:

1. The exam is ***two hours*** long.

2. The exam consists of 20 multiple choice questions worth 2 marks each and 5 graphing questions worth a total of 14 marks.

   The exam totals 54 marks.

   There are ***several versions*** of the exam. Check to make sure that the precoded version number on the Scantron sheet matches the version of the exam you are writing. Students attempting to alter the code on their Scantron sheet or to write an exam with a code that is different than the one on their Scantron sheet will be considered as having cheated and subject to academic sanctions.

3. Record your ***name*** and ***student number*** on both the question paper and the Scantron sheet.

4. Answers to the multiple choice questions should be recorded on both the Scantron sheet and the question paper (because only the question paper will be returned to you). ***You must have your answers recorded on the Scantron sheet in the allotted time.***

   The drawings required for the graphing questions are to be done on the question paper in the graphs provided. ***The scrap paper is for rough work only; IT WILL NOT BE MARKED.***

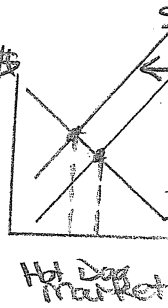
5. Round all answers to ***two decimal places***.

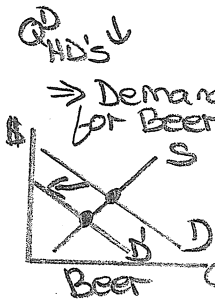
6. ***Hand in ALL materials***, including question paper, Scantron sheet, and scrap papers.

7. GOOD LUCK!

Part I. Multiple Choice. Choose the best answer. The questions are worth TWO marks each. Record your answer on both the question paper and on the Scantron sheet. The scrap papers are for rough work only; they WILL NOT BE MARKED.

1. The market for beer in Canada is initially in equilibrium with supply and demand curves of the usual shape (supply curve is an upward-sloping straight line and the demand curve is a downward-sloping straight line). All-Beef Hot dogs are a close complement in consumption with beer among university students (students tend to consume the two goods together, but not always). Suppose that mad-cow disease requires the slaughtering of all affected cows in Canada (noting that beef from cows are used to produce All-Beef Hot dogs). Which of the following accurately describes the new equilibrium in the market for beer?





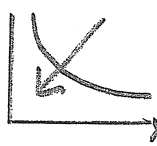
   A. The equilibrium price will rise; the change in the equilibrium quantity is ambiguous.
   B. The change in the equilibrium price is ambiguous; the equilibrium quantity will fall.
   C. The equilibrium price will fall; the change in the equilibrium quantity is ambiguous.
   D. The change in the equilibrium price is ambiguous; the equilibrium quantity will rise.
   (E) Both the equilibrium price and quantity will fall.

2. Which of the following is/are normative statements?
   A. A reduction in income taxes will increase a person's after-tax income. Positive
   B. If the government levies a higher tax on cigarettes, the equilibrium price of cigarettes will rise. Positive
   C. Gasoline costs too much. Normative (i.e. The price of gasoline should be...)
   D. The best way to assist low-income families with affordable housing is to subsidize family incomes. Normative
   (E) Both C and D are normative statements.

3. If a consumer has a utility function $U = -(x+2y)$, with marginal utilities $MU_x=-1$ and $MU_y=-2$, this consumer's preferences will violate which of the following properties?
   A. Completeness.
   B. Transitivity.
   (C) More is better.
   D. B and C are violated.
   E. None of the properties are violated.

Since $MU_x<0 \Rightarrow$ bad
Since $MU_y<0 \Rightarrow$ bad

4. Which of the following statements are TRUE?
   A. If a consumer likes two goods, then the utility level assigned to any bundle of the two goods can never be negative. False. ie, A monotonic transformation of U=XY to V=XY-10
   B. If a consumer's marginal utility for a good is negative, then his total utility will decrease as his consumption of the good increases. True
   C. If a consumer's marginal rate of substitution between two goods is diminishing, then it must be that the consumer likes the two goods. False. ie, 2 bads MU_x was x↑ MU_y was y↑
   D. It is not possible for the indifference curves of one individual to cross the indifference curves of another individual. False
   E. Both A and C are true.



5. Indifference curves have a positive slope when
   A. the consumer likes both good X and good Y. No
   B. the consumer dislikes both good X and good Y. No
   C. the consumer likes good X but dislikes good Y. yes
   D. the consumer likes good Y but dislikes good X. yes
   E. Both ~~D~~ C and ~~E~~ D are true.

$\Delta y/\Delta x < 0$
$\Delta y/\Delta x < 0$
$\Delta y/\Delta x > 0$
$\Delta y/\Delta x > 0$

6. Suppose a consumer views two goods, x and y, as perfect substitutes for one another. Which of the following utility functions might represent these preferences?
   A. $U = 20(100x + 200y)^2 - 5{,}000$ Monotonic transformation of $U = AX + BY$
   B. $U = 30(xy)^5 - 8{,}000$ Cobb Douglas
   C. $U = -5[\min(x,y)]^{-1} - 20{,}000$ Perfect Complements
   D. $U = xy + x$ other
   E. $U = 2x^2+4y^3$ other

7. Suppose that a consumer has a utility function with $MU_x=90x^2y^2$ and $MU_y=60x^3y$. What is the marginal rate of substitution?
   A. $3x/2y$
   B. $150x^5y^3$
   C. $90x^2y^2-60x^3y$
   D. $3y/2x$
   E. $60x^3y-90x^2y^2$

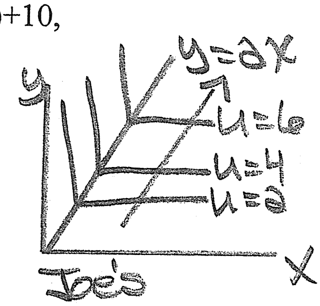
$MRS = \frac{MU_x}{MU_y} = \frac{90x^2y^2}{60x^3y} = \frac{3y}{2x}$

8. Suppose that a consumer has a utility function with $MU_x=1/(x^2y)$ and $MU_y=1/(xy^2)$.
   A. The more is better assumption is satisfied for both x and y in this utility function. $MU_x>0$; $MU_y>0$
   B. Marginal utility of x increases as x increases. No
   C. Marginal utility of y increases as y increases. No
   D. All are true.
   E. All are false.

9. Peter likes goods x and y and is always willing to trade 4 units of good y for 1 unit of good x. Which one of the following utility functions would represent Peter's preferences?
A. $U=xy^4$
B. $U=4x+y$
C. $U=-(4x+y)$
D. $U=\min(x,4y)$
E. $U=x+4y$

10. Loretta likes goods x and y, and always has exactly 12 units of x with every 3 units of y. Which one of the following utility functions would represent Loretta's preferences?
A. $U=x^{12}y^3$
B. $U=x+4y$
C. $U=3x+12y$
D. $U=\min(12x,3y)$
E. $U=\min(x,4y)$

11. Joe's utility function is $U=\min(2x,y)$, Adam's utility function is $U=20\min(x,y/2)+10$, Benjamin's utility function is $U=[\min(2x,y)-4]^2$, John's utility function is $U=-1/[\min(6x,3y)]$
A. Joe, Adam, and John all have the same preferences.
B. Joe, Adam, Benjamin and John all have the same indifference curves.
C. Only Joe, Adam and John have the same indifference curves and preferences.
D. All are false.
E. All are true.



12. Suppose the price of x is \$4 per unit, the price of y is \$5 per unit, and the consumer's income is \$50. Which of the following baskets is on the consumer's budget line?
A. x=5, y=6.
B. x=4, y=14.
C. x=7, y=12.
D. x=10, y=10.
E. x=25, y=0.

13. Fred consumes only two goods, olives and caviar, and he likes both. When the price of olives was \$9 per jar and the price of caviar was \$5 per jar, he spent his entire income to buy 5 jars of olives and 10 jars of caviar. Now the government subsidizes olives. Market prices haven't changed, but consumers get a subsidy of \$5 for every jar of olives consumed (this is automatically done at the check-out counter). To pay for the subsidy, the government introduces an income tax. Fred pays an income tax of \$20. If o is the number of jars of lives and c is the number of jars of caviar, what is the equation of Fred's new budget line?

A. $9o+5c=100$.
B. $14o+5c=95$.
C. $4o+5c=95$.
D. $4o+5c=75$.
E. $14o+5c=120$.

$9o+5c=I$
$9(5)+5(10)=95$
$(9-5)o+5c=95-20$
$4o+5c=75$

14. Suppose the price of x is \$1, the price of Y is \$5, and the consumer is currently spending all available income. At the consumer's current consumption basket, the marginal utility of X is 20 and the marginal utility of Y is 2.

A. The consumer is currently maximizing utility. No
B. The consumer could increase utility by consuming more of good X and less of good Y.
C. The consumer could increase utility by consuming more of good Y and less of good X.
D. The slope of the indifference curve at the current consumption basket is -1/10. No
E. Nothing can be said about the consumer's utility or how it could increase because we are not given the consumer's utility function.

$\frac{MU_x}{MU_y}=\frac{20}{2}=10 > \frac{1}{5}=\frac{P_x}{P_y}$

$\therefore \frac{MU_x}{P_x} > \frac{MU_y}{P_y}$

buy more x, less y

Cobb Douglas

15. Suppose $U=x^2y$. For this utility function $MU_x=2xy$ and $MU_y=x^2$. Further suppose that the consumer's budget constraint can be expressed as $4x+2y=12$. For this consumer, the optimal amount of good x to buy would be

A. 2
B. 4
C. 6
D. 10
E. 20

① $4x+2y=12$
② $\frac{MU_x}{MU_y}=\frac{2xy}{x^2}=\frac{2y}{x}=\frac{4}{2}=\frac{P_x}{P_y}$

Perfect complements

$\Rightarrow y=x$

② ⇒ ① ⇒ $4x+2[x]=12$
$x=2$

16. Suppose $U=\min(5x,4y)$. Further suppose that the consumer's budget constraint can be expressed as $6x+4y=132$. The consumer's optimal consumption basket would be

A. $(x,y)=(4,5)$
B. $(x,y)=(22,33)$
C. $(x,y)=(12,15)$
D. $(x,y)=(22,0)$
E. $(x,y)=(0,33)$

① $6x+4y=132$
② ray: $y=\frac{5}{4}x$

② ⇒ ① ⇒ $6x+4\left[\frac{5}{4}x\right]=132$

$x=12$

$\therefore y=\frac{5}{4}x=\frac{5}{4}(12)=15$

— Perfect Substitutes

17. Suppose $U=6x+2y$. For this utility function $MU_x= 6$ and $MU_y=2$. Further suppose that the consumer's budget constraint can be expressed as $2x+6y=300$. The consumer's optimal consumption basket would be

A. (x,y)=(6,2)
B. (x,y)=(2,6)
C. (x,y)=(0,50)
D. (x,y)=(150,0)
E. (x,y)=(3,3)

$\frac{MU_x}{P_x} = \frac{6}{2} = 3 > \frac{1}{3} \frac{2}{6} = \frac{MU_y}{P_y}$

$\Rightarrow$ buy all x $\therefore y=0$

$\Rightarrow$ ① $\Rightarrow 2x+6(0)=300$, $x=150$

18. If she spends all her income, Vanessa can afford to buy 47 apricots and 10 cherries. She can also just afford 20 apricots and 19 cherries. The price of apricots is \$0.18. What is the price of cherries?

A. \$0.54
B. \$3.00
C. \$0.27
D. \$16.67
E. \$2.25

$P_a a + P_c c = I$

$0.18(47) + P_c(10) = I$

$0.18(20) + P_c(19) = I$

$\therefore 0.18(47) + P_c(10) = 0.18(20) + P_c(19)$

$\Rightarrow P_c = 0.54$

Use the following to answer the next two questions:

Max has an income of \$1000 and consumes only two goods, good x and good y. The price of good y is \$2 per unit. The price of good x is \$5 per unit for the first 20 units and \$10 per unit for each additional unit.

19. What is the maximum number of units of good x that Max can buy with his income?

A. 200
B. 110
C. 100
D. 90
E. 20

$5\bar{x} + 10\hat{x} = 1000$

$5(20) + 10\hat{x} = 1000$

$\hat{x} = 90$

$\therefore x = 20 + 90 = 110$

20. What are the (x,y) coordinates at the kink of Max's budget line?

A. (x,y) = (0, 100)
B. (x,y) = (90, 0)
C. (x,y) = (192,20)
D. (x,y) = (20, 90)
E. (x,y) = (20,450)

$5\bar{x} + 2y = 1000$

$5(20) + 2y = 1000$

$y = 450$

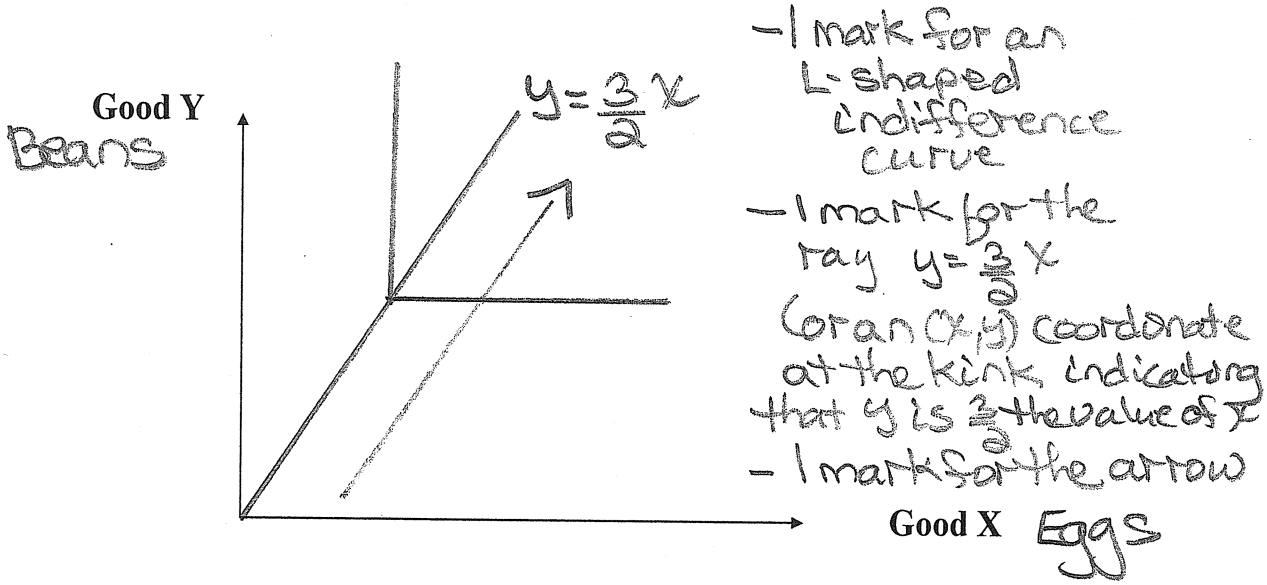
Part II. Graphing. This part of the exam requires you to sketch indifference curves. It is worth a total of 14 marks. Sketch the required indifference curves on the question paper in the graphs provided. The scrap papers are for rough work only; they WILL NOT BE MARKED.

(9 marks)

1. For the following sets of goods, draw an indifference curve in the graphs provided and make an arrow pointing in the direction of greater preference (***or arrows if the curve changes shape after some critical point***). Draw each indifference curve, placing the amount of the first good, good X, on the horizontal axis and the amount of the second good, good Y, on the vertical axis. No marks will be given if the goods are placed on the wrong axes. To be accurately drawn, some of your indifference curves may require you to provide additional information (like equations of rays, slopes of straight lines, critical X and/or Y values, etc.), so make sure that when this information is needed, it is clearly labelled on the graph.

   (3 marks)

   a. Eggs and beans. (Arnold likes to eat breakfast, and has exactly 2 eggs with every 3 cans of beans.)



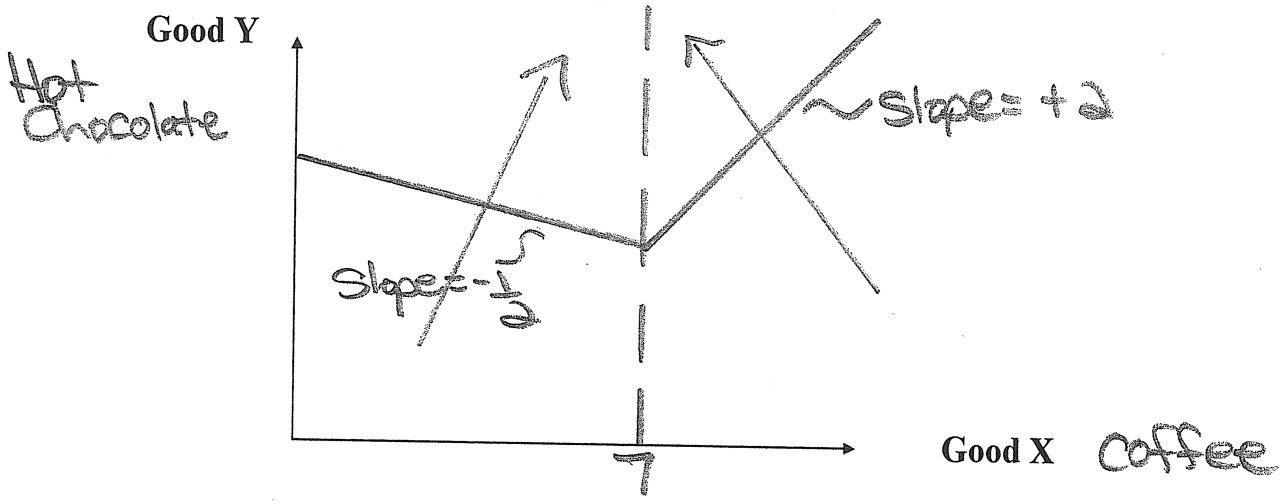
Be sure that in the diagram above, you have placed the goods on the correct axes, remembered to draw all the necessary arrows, and clearly labelled any additional information that is needed (like equations of rays, slopes of straight lines, critical X and/or Y values, etc.).

(3 marks)

b. Coffee and hot chocolate. (Sara likes hot chocolate. However, she has some reservations about coffee. When she consumes fewer than 7 cups of coffee, she thinks that 2 cups of coffee are a perfect substitute for 1 cup of hot chocolate. However, after 7 cups of coffee, Sara begins to dislike coffee, but is willing to exchange 2 cups of hot chocolate for every additional cup of coffee she is forced to drink.)

Slope $= \frac{\Delta Y}{\Delta X} = -\frac{1}{2}$

Slope $= \frac{\Delta Y}{\Delta X} = \frac{2}{1}$



- 1 mark for each straight line with the correct slope
- 0.5 marks for each correct arrow

Be sure than the diagram above, you have placed the goods on the correct axes, remembered to draw all the necessary arrows, and clearly labelled any additional information that is needed (like equations of rays, slopes of straight lines, critical X and/or Y values, etc.).

(3 marks)

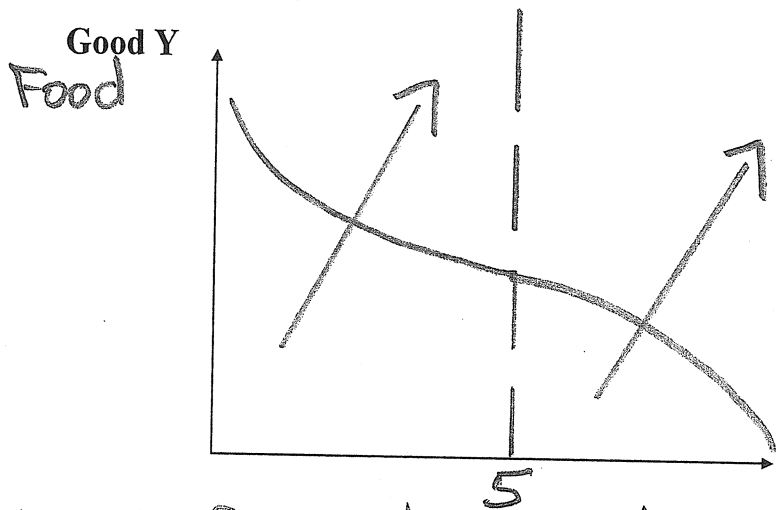
$MU_y > 0$ and constant

c. Alcohol and food. (Eric likes food, and gets a constant marginal utility as he consumes more of food regardless of the amount of food he has already consumed. Eric also likes alcohol, and notices that when he has less than 5 glasses of alcohol his marginal utility from consuming alcohol decreases as his consumption of alcohol increases; however, after 5 glasses he still likes alcohol but his marginal utility from consuming alcohol increases as his consumption of alcohol increases.)

When $X \leq 5$, $MU_X \downarrow$ as $X \uparrow$
When $X > 5$, $MU_X \uparrow$ as $X \uparrow$

$\Rightarrow MRS = \frac{MU_X \downarrow}{MU_Y}$ as $X \uparrow$ and $Y \downarrow$

$\Rightarrow MRS = \frac{MU_X \uparrow}{MU_Y}$ as $X \uparrow$ and $Y \downarrow$



- 1 mark for each correct curve
- 0.5 mark for each correct arrow

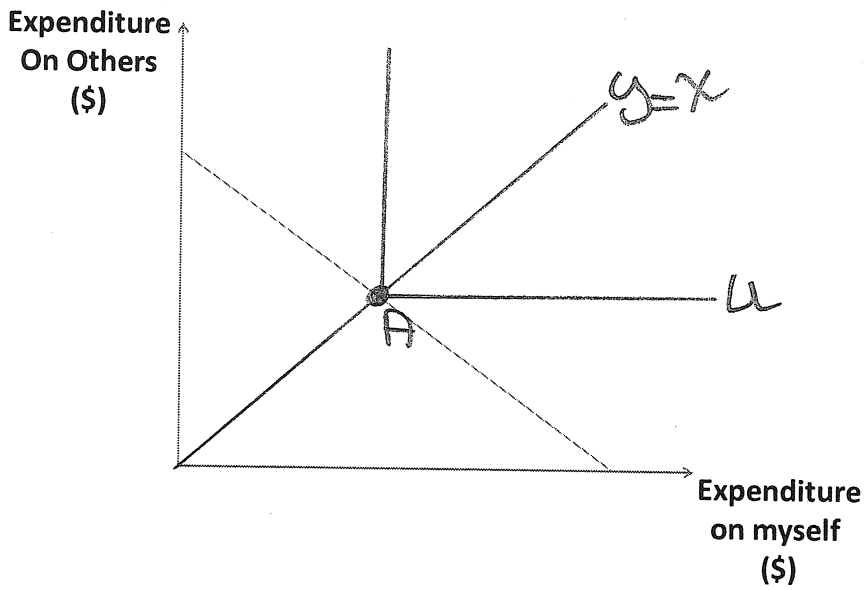
Be sure that in the diagram above, you have placed the goods on the correct axes, remembered to draw all the necessary arrows, and clearly labelled any additional information that is needed (like equations of rays, slopes of straight lines, critical X and/or Y values, etc.).

(5 marks)

2. Peter can spend his earned money on himself and he can also spend it on others (by donating to charity). Peter's budget line is plotted in the graphs below. For each case, sketch Peter's indifference curve at the optimal choice, **labelling the indifference curve as U and the optimal choice as point A**. To be accurately drawn, your indifference curve may require you to provide additional information (like equations of rays, slopes of straight lines, critical X and/or Y values, etc.), so make sure that when this information is needed, it is clearly labelled on the graph.

   (3 marks)

   a. Peter likes to keep some of his earned income for himself and he also likes to donate to charity. In fact, Peter always donates exactly half his income to charity and is completely unwilling to make any substitutions away from this fixed proportion. Perfect Complements



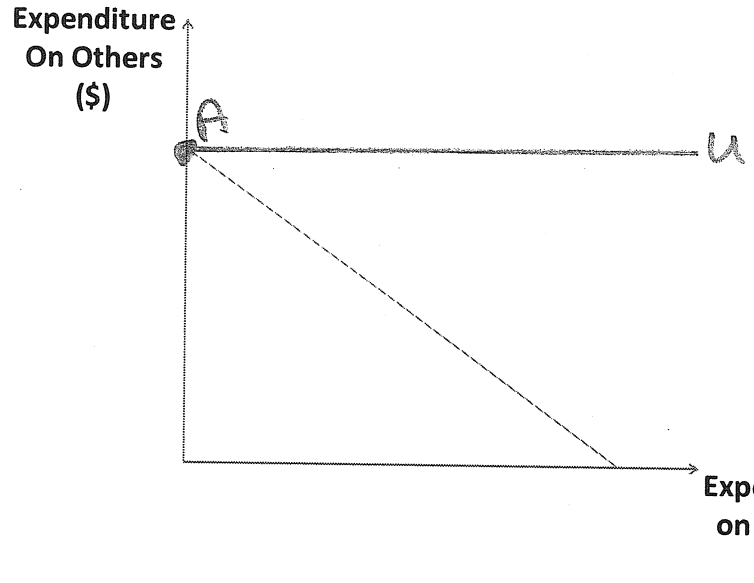
Be sure that in the diagram above, you have labelled your indifference curve as U and the optimal choice as point A, and clearly labelled any additional information that is needed (like equations of rays, slopes of straight lines, critical X and/or Y values, etc.).

- 1 mark for an L-shaped indifference curve labelled U
- 1 mark for the ray labelled y=x
- 1 mark for the optimal choice at A

(2 marks)

b. Peter does not care to have money for himself; he only enjoys giving his money to charity.

Neutral good



- 1 mark for the indifference curve labelled U
- 1 mark for the optimal choice at A

Be sure that in the diagram above, you have labelled your indifference curve as U and the optimal choice as point A, and clearly labelled any additional information that is needed (like equations of rays, slopes of straight lines, critical X and/or Y values, etc.).