

## ECO 101A: Tutorial # 4 (Consumer behaviour)

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1. Charles has the following utility function:  $U(X, Y) = X^{1/2} + Y^{1/2}$  where  $X$  is his consumption of chewing gum, with price  $P_X = \$1$ , and  $Y$  is his consumption of espressos, with  $P_Y = \$3$ .
  - a) Find out  $MRS(X, Y)$ .
  - b) Derive his demand for chewing gum ( $X$ ) and espresso ( $Y$ ).
  - c) Assume that his income is  $M = \$100$ . How many chewing gums and how many espressos will Charles consume?
  - d) What is the marginal utility of income?
2. Alan has a weekly income of \$200 that he allocates among two goods: meat ( $X$ ) and potatoes ( $Y$ ).
  - a) Suppose meat costs \$4 per pound and potatoes \$2 per pound. Draw his budget constraint.
  - b) Suppose also that his utility function is given by the equation  $U(X, Y) = 2X + Y$ . What combination of meat and potatoes should she buy to maximize his utility?
  - c) Alan's supermarket has a special promotion. If he buys 20 pounds of potatoes (at \$2 per pound), he gets the next 10 pounds for free. This offer applies only to the first 20 pounds he buys. All potatoes in excess of the first 20 pounds (excluding bonus potatoes) are still \$2 per pound. Draw his new budget constraint.
  - d) An outbreak of potato rot raises the price of potatoes to \$4 per pound. The supermarket ends its promotion. What does his budget constraint look like now? What combination of meat and potatoes maximizes his utility?
3. Elena always consumes 3 teaspoons of jam ( $X_1$ ) with each bagel ( $X_2$ ). Define 1 teaspoon as the unit of jam and 1 bagel as the unit of bread.
  - a) Write a utility function that would represent her preferences.
  - b) Find  $MRS$  in this case.
  - c) If the price of jam is  $P_1$  per teaspoonful and the price of bread is  $P_2$  per bagel and the consumer has  $M$  dollars to spend on bread and jam, how much will she purchase?
4. Suppose  $U(X, Y)$  is the original utility function and  $V(X, Y)$  is a transformation of  $U(X, Y)$ . If the marginal rate of substitution ( $MRS$ ) at any point doesn't change, we know that we have a monotonic transformation. The equal  $MRS$  tell us that the shapes of the indifference curves are the same for  $U(X, Y)$  and  $V(X, Y)$ . Then the two utility functions represent the same set of preferences. Assume  $U(X, Y) = X^{0.5} Y^{0.5}$  and  $V(X, Y) = \ln[(X^{0.5} Y^{0.5})^2]$ . Is  $V$  a monotonic transformation?