

First Midterm Exam

Each part of a question (a, b, c, etc.) is worth 5 points. Make sure to allot your time accordingly. Total of 30 points, -1 for messiness, -2 for extreme messiness.

When you are finished, please keep the exam sheet and hand in your blue book. Thanks.

1. *Albums*. In 2012, sales of digital music albums were 118 (million) and sales of vinyl albums were 4.5. In 2013, sales of digital albums were the same at 118 and sales of vinyl albums were 6.

Let's assume it's the "representative consumer" who buys these albums, so they're all in one indifference curve / budget line diagram. Assume that in both years the consumer makes a utility-maximizing decision.

Consider each of the following changes in isolation. Are both of them consistent with the utility maximizing model and the consumption pattern described above? Illustrate on two separate diagrams with digital on the vertical axis and vinyl on the horizontal.

- (a) Price of vinyl declined and price of digital went up.
- (b) Price of vinyl declined and price of digital stayed the same.

2. *MRS*. Let an individual have the utility function

$$u(x, y) = x^{1/3}y^{2/3}$$

Use the standard space with x on the horizontal axis and y on the vertical axis for the following:

- (a) Compute the marginal rate of substitution when $x = y = 8$. Draw on a graph.
- (b) Compute the marginal rate of substitution when $x = 512$ and $y = 1$. Why is it different from part (a)? What does this explain about the person's preferences?
- (c) Use the total differential to estimate the change in utility from starting at $x = y = 8$ and moving to $x = 512, y = 1$. (Use the point $(8,8)$ to evaluate the partial derivatives.)
- (d) The estimate from part (c) is much larger than the actual change in utility. Why? Since it's wrong, does it mean that differentials are not very useful in real life?