Econ 300 Review Sheet for Second Midterm

As was the case for the first midterm, the upcoming exam will pose questions on:

- terminology and notation
- why economists use math
- calculations typically applied by economists to solve economic problems

We recommend that you prepare for the exam by completing two different types of tasks, described below as A and B.

A.

Work through the concepts listed below and make sure for each term you can recognize and apply:

- the definition in words (in some cases what we have called “intuitive meaning”),
- any corresponding mathematical expression, formula, or graph
- the relevance to economic analysis

As you do this, you should create a "cheat sheet" on a standard sheet of paper (two-sided). You can put whatever you like on this sheet of paper in whatever form you like, and can use it during the exam. You should include the 8 rules of differentiation on your cheat sheet, and know how to apply each rule.

Some of the concepts listed are mathematical terms which can be applied to economics, and some are economic terms that have a mathematical formulation; either way, you should understand the linkage between math and economics demonstrated by each concept. Some examples of these types of questions are provided to help you anticipate the way a concept leads to a question. More generally, you might find it useful to take each concept on the list and think of one or two possible exam questions similar to the examples but relevant to that particular concept.

B.

You should review all of the problem sets 1-4, and the exercises presented in lecture and in discussion section, as many of the calculation-type problems on the exam are drawn from these exercises. Other exercises presented in the book are good sources of review, and at least one or two exam questions will reflect the other exercises found in the book. You should take the prior exam, which is on the course web site. After you complete the exam (which should take you less than 50 minutes!), you should check your answers with the answers posted on the course web site. Problems you did not get correct are a good indicator of where you need to do additional work.

List of Key Concepts and Terminology

first derivative of a univariate function
second derivative of a univariate function
the relationships between second derivatives and concavity or convexity of a function
elasticity (point versus arc, income elasticity, own-price versus cross-price elasticity, etc., inelastic versus elastic versus unit elastic)
average and marginal as applied to production or cost functions
first-order partial derivative of a multivariate function with respect to a specific independent variable
second-order partial derivative of a multivariate function with respect to a specific independent variable
bivariate function
diminishing marginal returns

cross partial derivatives
Young's Theorem
implicit functions
isoquants
the slope of isoquants
marginal rate of substitution
the multivariate differential
homogeneous functions of degree *k*
constant versus increasing versus decreasing returns to scale
optimal outcomes (extreme values)
stationary point
first order conditions
second order conditions
sufficient conditions for a local minimum
sufficient conditions for a local maximum

Example questions

About notation:

Given the function $y = f(x_1, x_2)$ we can use which of the following to denote the cross partial derivative with respect to x_1 ?

A. f_{12}

B. f''

C. $\frac{\partial y}{\partial x}$

D. All of the above

E. None of the above

About the economic meaning of a mathematical concept:

Suppose that a firm wants to choose the level of output which leads to the highest amount of profits. We could model this firm's decision by expressing profits as a function of output and then:

A. figuring out if that function is homogenous of degree 1

B. figuring out the value of output which leads to a local minimum

C. figuring out the value of output which leads to a local maximum

D. figuring out the cross partial derivatives

E. figuring out the stationary point for the function

About computation:

Given the function $f(x_1, x_2) = 4x_1 + 2x_2 + x_1^2 + x_2$, the second-order partial derivative with respect to x_1 is:

A. -2

B. 0

C. 2

D. 4

E. None of the above