Econ 300 Review Sheet for Final Examination

As was the case for the first and second midterms, 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.

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, the midterm exams, 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.

You need to know when and how to apply each rule of differentiation. For example, you don't want to apply the product rule to differentiate the function $f(x) = 12x + x^2$, but it would be useful for $g(x) = (2x + 1)(5x + 7)$.

<u>List of Key Concepts and Terminology</u>

From first midterm:
real numbers
integers
intervals
sets
univariate functions
domain of a function
range of a function
validity of a function
independent variables

dependent variables
endogenous variables
exogenous variables
parameters
intercept
slope
formula for a straight line
formula for average rate of change
secant line
parabola
increasing or decreasing functions
strictly increasing or strictly decreasing functions
monotonic functions
inverse of a function
multivariate functions
Cobb-Douglas function
isoquants and indifference curves
extreme values: maxima and minima, global and local
limits
continuity
concavity, strict concavity
convexity, strict convexity
exponential functions
compound interest rates
present value
frequency of compounding
continuous compounding
logarithmic functions
natural logarithmic functions
growth rates
systems of equations
general equilibrium models
partial equilibrium models
differential calculus
comparative statics
difference quotient
derivative
instantaneous rate of change
tangent line
differentiability and the question of the existence of a derivative
differential
marginal cost
marginal utility
From second midterm:
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
After second midterm:
constrained optimization
substitution method
Lagrange method
Lagrangian
Envelope theorem
Shadow price
Kuhn-Tucker method
complementary slackness conditions
probability
addition rule
mutually exclusive
law of large numbers
lottery
expected value
random variable
probability distribution
independence
conditional probability
expected utility
risk averse, risk neutral, risk lover
Pratt measure of risk aversion
game theory
normal form game
best response mapping
dominant strategy, dominated strategy, dominant strategy equilibrium

never a best response strategy
iterated elimination of never a best response strategies
Nash equilibrium
mixed strategy equilibrium

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