

This review sheet is intended to cover everything that could be on the exam; however, it is possible that I will have accidentally left something off. You are still responsible for everything in the chapters covered except anything that I explicitly say you are not responsible for. Therefore, if I left something off of this sheet, it can still be on the exam. There will be no multiple-choice questions. Most of the questions will be like the ones in the homework assignments, and possibly a few definition questions, but I am more likely to ask questions that make you use the definitions rather than recite them. I will probably ask one of the questions from the book at the end of the chapters.

The review session will be at a time to be determined, probably Monday, 2/15 in the normal room.

Chapter 1: What are **exogenous variables, endogenous variables, parameters, relationships, equilibrium, statics, and dynamics**?

Chapter 2.1: Understand what **sets, subsets, and elements** are. Understand set notation and the symbols  $\in, \subset, \supset, \subseteq, \supseteq, \not\subset, \not\supset, \not\subseteq, \not\supseteq$ , and  $\notin$ . Know what  $\Leftrightarrow$  means. Be able to draw and interpret **Venn diagrams**. What is the symbol for the **empty set**, a.k.a. **null set**? Know how to find the sets for  $\cap$  and  $\cup$ . What are **disjoint sets**? What is the symbol for the **complement set**? Be able to find the **relative difference of two sets**. Be able to recognize a **partition of a set**.

Chapter 2.2: Now what the following sets are:  $\mathbf{Z}, \mathbf{Z}_+, \mathbf{Q}, \mathbf{R}, \mathbf{R}_+,$  and  $\mathbf{R}_{++}$ . Know the following properties of real numbers: **closure, commutative laws for + and \*, associate laws for + and \*, distributive law, the properties of zero and one, negation, reciprocals, completeness, transitivity, reflexivity, and equality**. Knowing the **dimensions (units)** of economic variables will help you to write equations which make economic sense.

Chapter 2.3: Know how to plot an **ordered pair** on the **coordinate system (Cartesian Plane)**. Know how to do a **Cartesian product** like  $\{1, 2, 3\} \otimes \{4, 5, 6, 7\}$ . Be able to show intervals on a number line like,  $[1, 4), (-\infty, 7]$ , etc. Know the difference between an **open interval, closed interval, and half-open interval**. What do **bounded** and **compact** mean? Know how to tell if a set is **convex**. (A line connecting two points is entirely in the set.) Memorize the **Euclidian distance formula** (which is easier than it looks.) Know what an  **$\epsilon$ -neighborhood** is. Note that the definitions of a **boundary point, interior point, and convex set** easier than they look.

Chapter 2.4: Know what **function, domain, range, image, and value** are. Be able to tell if the function is **one-to-one, onto, and/or one-to-one correspondence**. (The former is the vertical line test, while the middle one is the horizontal line test, and the latter is both tests.) When is a function **invertible**? Know what a **composite mapping** is. Know what is meant by **slope coefficient** and **intercept term** in a **linear function**. An **implicit function** is basically  $f(X, Y)=0$ . (*Y is a function of X, but it is not explicitly written out.*) Know that **quadratic** functions have a maximum or minimum at  $x = -b/2a$  where  $Y = aX^2 + bX + c$ . **Rectangular hyperbolas** are of the form  $XY=a$ . Know how to plot **power functions** ( $Y = aX^b$ ) and **exponential functions** ( $Y=a*b^X$ ). Know what **logarithmic functions** are including the **natural log**. Note that for all bases (including  $e$  so it applies to the natural log  $\ln$ ) that  $\log_b(X*Y) = \log_b(X) + \log_b(Y)$  which means  $\log_b(X^a) = a*\log_b(X)$  and  $\log_b(X/Y) = \log_b(X) - \log_b(Y)$ . The definitions of **concave** and **convex** are fairly simple (concave looks like a cave so all points on the **secant** are below the line.). Putting **strictly** in front of them means the equality does not hold. For **quasi-concave**, the **better set** of the isobar (level curve) is convex. For **quasi-convex**, the **worse set** of the isobar (level curve) is convex. Note that the **Cobb-Douglas** function  $f(X,Y)=X^aY^b$  normally uses the assumption that  $a+b<1$ .

Chapter 3.1-3.2: A **sequence** is a succession of numbers of the form  $f(1), f(2), f(3), \dots$  like  $f(n) = n^2$  where  $n \in \mathbf{Z}_+$  or  $a_1, a_2, a_3, \dots$ . Know how to tell if it has a **limit**. (For a  $n > N$ ,  $|a_n - L| < \epsilon$  for an arbitrarily small  $\epsilon$ .) If there is no limit, it is **divergent**. **Definitely divergent** if the limit is  $\infty$  or  $-\infty$ . It is **bounded**

if there is a range the values do not exceed for large  $n$ . ( $|a_n| < K$ ).

Chapter 3.3: Understand why  $PV = FV_t / (1+r/n)^{nt}$  for **discrete compounding** and  $FV_t = PV * e^{rt}$  or  $PV = FV_t e^{-rt}$  for **continuous compounding**. There will be more of this in Chapter 3.5.

Chapter 3.4: The limits of sequences have nine properties which are very intuitive on Pages 79 and 81. **Monotonically increasing** and **monotonically decreasing** are exactly what you would expect. It is **bounded** if there is both an upper bound and a lower bound.

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Nongraded Homework #2A to be reviewed with Homework #2.

1) (15 points each) For each of the following, plot the first 6 points of the sequence. Determine if is bounded and determine if it has a limit. Explain your logic.

A)  $F(n) = 16 * (2^{-n})$

B)  $F(n) = 3^{-1^n}$

C)  $F(n) = -2^n$

2) (10 points) Find  $\lim_{n \rightarrow \infty} \left( \frac{7 + \frac{5}{n}}{3 - \frac{6}{n^2}} \right)$

3) (10 points) Find  $\lim_{n \rightarrow \infty} \left( \frac{n^2 + 3n + 6}{4n^3 + 8n - 8} \right)$

4) (10 points) Find  $\lim_{n \rightarrow \infty} \left( \frac{n^2 + 3n + 6}{4n^2 + 8n - 8} \right)$

5) (10 points) Find  $\lim_{n \rightarrow \infty} \left( \frac{n^2 + 3n + 6}{8n - 8} \right)$

6) (5 points each) Write the formula for the present value of each of the following. Briefly explain how you got each one.

A) \$5000 paid in 6 years, with 6% interest compounded monthly.

B) \$1000 paid in 3 years with 10% interest compounded continuously.

C) \$600 paid in 4 years with 5.2% interest compounded weekly.