

Math 12002  
Exam I Review

Exam I will be given in class on **Monday, January 23, 2012**. It will cover Chapter 1 (except that §1.1 and §1.2 will not be covered explicitly). The problems will be similar to the homework problems, though you will also be asked to state certain definitions (listed below). You will be expected to **explain** your answers and use proper notation. There may also be short answer or short “discussion” questions on the concepts covered in Chapter 1.

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Concepts, Definitions, and Theorems:

- Limits — be able to state the definition given in class of limit (Definition 1, §1.3); one sided limits, relation between limits and one sided limits; limit laws; Squeeze Theorem
- Infinite limits, vertical asymptotes; limits at infinity, horizontal asymptotes
- Continuity — be able to state the definition of continuity at a point (Definition 1, §1.5); Intermediate Value Theorem
- **Not** covered on exam: types of discontinuities (removable, infinite, jump), left continuity, right continuity, and continuity on intervals

Basic Skills – you will be expected to be able to do the following:

- Compute  $\lim_{x \rightarrow a} f(x)$  for functions  $f$  of the type in the examples and homework of §1.3 and §1.4, either algebraically or from graphs. If a limit does not exist, explain why.
- Compute one-sided limits and determine if  $\lim_{x \rightarrow a} f(x)$  exists by computing and comparing  $\lim_{x \rightarrow a^-} f(x)$  and  $\lim_{x \rightarrow a^+} f(x)$ .
- Use limit laws to compute limits. Be aware of when properties are not valid.
- Compute  $\lim_{x \rightarrow a} f(x)$ ,  $\lim_{x \rightarrow a^+} f(x)$ , and  $\lim_{x \rightarrow a^-} f(x)$  when these limits are infinite; find all vertical asymptotes of a given function.
- Compute  $\lim_{x \rightarrow +\infty} f(x)$  and  $\lim_{x \rightarrow -\infty} f(x)$ ; find all horizontal asymptotes of a given function.
- Spell the word ASYMPTOTE.
- Given a “position function” (such as altitude of a ball at time  $t$ ), compute average velocity on an interval and estimate or compute exactly instantaneous velocity at a given time.
- Determine if a given function is continuous at a given point, or determine all points where a function is continuous; explain *why* a function is or is not continuous at a given point in terms of the limit definition of continuity.
- Use the Intermediate Value Theorem to approximate roots of polynomials.