

Review for Exam 2, Thursday, November 7

MATH 110: Discovering in Mathematics

Notes:

1. To prepare for the exam, be sure that you have reviewed all class notes and Sections 2.5-2.7, 10.4 and 3.1-3.4 in the text. Below is a list of some types of problems you should know. This is not meant to be exhaustive!
2. Remember that HOW you solve the problems is more important than what your final answers are. Be sure to justify ALL your work. Read the directions carefully! **Most solutions will require sentences!**
3. Bring a pencil (or several!) with a good eraser.
4. Neatness is a plus! Make sure I can follow your work on your exam.
5. Remember that your journal is due at the exam. Double check to make sure you have completed all problems listed for your journal work. Doing these should have helped you understand the material as we progressed, and review for the exam throughout each week instead of waiting until exam week. I will be grading three to four problems completely and checking to see whether you have worked on the rest. Be sure your journal follows the guidelines to obtain credit! **I will not accept journals that are not neatly three-hole-punched and in a three-ring binder.**
6. I will provide you with a non-graphing calculator for the exam.
7. There will be randomized seating at the exam. You may want to wait until the names have been laid out on desks before taking a seat.

Some Types of Problems:

For all of these problems you should be able to explain the process and show the details, not just obtain a final answer.

1. Discuss some history of the public key coding system and what is involved in making it work.
2. Explain what a rational number is.
3. Prove a number is irrational using proof by contradiction.
4. Prove that a terminating or repeating unending decimal is rational by expressing it as a fraction of natural numbers.
5. Understand properties of real, rational and irrational numbers (for example, what their decimal expansions might look like) and be able to answer true/false or short answer questions about them.
6. Prove that two decimal expressions are equivalent (can you remember what we showed were equivalent?).
7. Describe different voting schemes.
8. Given voting data, be able to determine who the winner of an election is with various voting schemes, and to determine which voting scheme you would use to force a certain winner.
9. Describe the ideals we look for in a voting scheme, how some of our schemes can or cannot meet those ideals, and why there is no perfect scheme (quoting a theorem would be helpful here!).
10. Determine whether or not there is a one-to-one correspondence between two finite sets.
11. Define cardinality and subset.

12. Show that there is a one-to-one correspondence between two infinite sets.
13. Prove that there is no one-to-one correspondence between two infinite sets.
14. Be able to apply the definition of one-to-one correspondence to a question.
15. Use Cantor's diagonalization argument to produce a number not on a list of given correspondences.
16. Find all the subsets of a set, and (similarly) find the power set of a set and know how many elements it has.
17. Describe what Cantor's Power Set Theorem tells us and why it is important.
18. Any problem that is like a journal problem!