

# MATH 221 - STUDY GUIDE FOR TEST 1

**General Guidelines for Studying:** The test will be 25 multiple choice questions, of which 12 will be based on the 12 quiz questions you have had so far in the course. These 12 questions may not be identical to the quiz questions, but they will be very similar. If you understand not only what the answer was on a quiz problem but also why the answer was what it was, then you should have no problem on the corresponding test question. The remaining 13 questions on the test were obtained by the instructor by going through the class presentations available directly at:

<http://www.math.sc.edu/~filaseta/courses/Math221/the221password.html>

It would be wise to review the material, especially any questions posed, that appear in these presentations. This includes all of the homework problems that we went over in class.

## Specific Items to Know:

- the main headings in the 4-step problem-solving process
- problems involving recognizing patterns
- arithmetic and geometric sequences
- the Fibonacci sequence (as in the quiz)
- set notation and terminology (set builder notation, proper subset, intersection, universal set, complement,  $\emptyset$ ,  $=$ ,  $\cup$ ,  $\cap$ ,  $\in$ ,  $\notin$ ,  $\subset$ ,  $\not\subset$ ,  $\bar{A}$ ,  $B - A$ )
- Venn diagrams
- De Morgan's laws (i.e.,  $\overline{A \cup B} = \bar{A} \cap \bar{B}$  and  $\overline{A \cap B} = \bar{A} \cup \bar{B}$ )
- Addition and Multiplication models (line model for addition and subtraction; repeated addition, array, and area models for multiplication)
- Properties of Addition and Multiplication (eg., the commutative property of addition, the distributive property of multiplication over addition; also, review how we used models to describe these)
- The division algorithm, quotients and remainders
- the order of operations (PEMDAS)
- the expanded form of a number (in different bases)
- how to use blocks, flats, longs and units to describe numbers to different bases

## Specific Problems on Problem Solving:

- Understand the picture argument for determining  $1 + 2 + 3 + \dots + n$ .
- Have some idea of how we approached the problems concerning WOW and CIRCLE.
- Review how we approached the problem involving diagonals of a regular polygon.

## Comments:

- Specific definitions or statements of results will not be asked (other than for the quiz question on the 4-step problem-solving process). But you will need to know the terminology and the results.
- I am more interested in what you understand about the approaches used for the specific problems related to problem solving mentioned above. Knowing the answers might help a little but not for the most part. It is more important to understand the thought process we went through to get at the answers.
- Some specific problems that you do not need to review even if they are fun to look at are: the problem about 6 men and 2 boys crossing a river, the Fibonacci type problem starting with 4 and ending with 67, the problem about hand shakes at a party, the problem involving placing numbers in 7 hexagons, the public bus system problem from California, the comparison between  $\sqrt[10]{10}$  and  $\sqrt[3]{2}$ , and the problem of getting 4 quarts of water from jugs.