ELEMENTARY ANALYSIS.

Mathematics 315  CRN 22894

Time: 11:00-11:50 MUWF  
Place: 303 Deady Hall  
Instructor: F. W. Anderson  
Office: 332 Fenton  
Phone: 5625  
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Hours: 10:00-10:50 M, 1:00-1:50 W, 2:00-2:50 F.  

Texts: K. A. Ross, Elementary Analysis: The Theory of Calculus  
F. W. Anderson, Preliminaries for Elementary Analysis.  

Website: http://darkwing.uoregon.edu/~anderson/math315/math315.html  

Exams:  
In addition to a two hour final exam there will be two fifty minute exams given during regular class periods.  

Exam 1. February 3, 2006  

Homework:  
There will be a written homework assignment each week. These will be due each week on Friday. In addition there will be several Special Assignments handed out in class. These may be due at varying times. Late work will not be accepted. Instructions for preparing homework assignments are provided on a separate page.  

Grade:  
Your course grade will be based on your homework, including Special Assignments, your performance on the two fifty minute exams, and the final exam. The relative value of these components is:  

<table>
<thead>
<tr>
<th>Component</th>
<th>Value</th>
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<tbody>
<tr>
<td>Homework</td>
<td>25%</td>
</tr>
<tr>
<td>2 Exams (@ 20%)</td>
<td>40%</td>
</tr>
<tr>
<td>Final Exam</td>
<td>35%</td>
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Homepage: This course comes with its own homepage; its URL is listed above. There you will find downloadable copies of many documents, including this one, that may be helpful to you during the term. It will probably be a good policy to check this homepage regularly. To access these documents you will need to have Acrobat Reader on your computer. This is free and easily downloaded from:  

http://www.adobe.com/prodindex/readstep.html
Homework Preparation

Homework is an integral part of this course, and you should treat its preparation seriously. Sloppy work is evidence of sloppy thinking, and the latter will not do in mathematics. Thus, we expect the work that you turn in to be done thoughtfully and to be presented in good style — neat, clear, and grammatically sound.

Working with others in the class is not only acceptable, but encouraged. Discussing problems is often an excellent way to master them. What is not acceptable is copying; if two or more of you work on a problem, we expect that each of you will write up the problem on his or her own. And we do ask that if your work with others on a problem played a role in your solution, then please acknowledge that on your paper.

Following are some ground-rules for preparing and submitting all homework:

1. All work to be turned in must be done on standard 8\(\frac{1}{2}\) × 11 inch notepaper. Do not use loose-leaf paper that has been torn from a binder.

2. Leave a one inch margin at the top and left sides of the paper.

3. Use only one side of each page.

4. Start each problem at the left margin. Do not put more than one column of problems on any page. Multiple parts (a, b, c, ...) of the same problem should each start at the left margin.

5. Work each problem in a logical order from top to bottom. Use a new line for each step of the problem.

6. Write legibly. Only work that is neat, legible, and well organized will be accepted. [If you use pencil, erase anything you don't want graded. If you use ink, use white-out on your mistakes. If necessary, copy your work over neatly before turning it in.]

Regular Homework.

There are some special requests for submitting the regular weekly assignments. This applies to each week’s assignment. If you have more than one page to turn in, staple pages together in a single package, but do not fold the corners over or use tape, straight pins, paper clips, etc. to attach the papers to each other. When the work is submitted, the paper should be folded lengthwise, your name placed at the top, and below your name should be written the assignment number and a list of those exercises that you believe you have completed successfully.

Special Assignments.

The Special Assignments given out in class are to be treated somewhat differently. If there are multiple pages, they should be stapled together in the upper left corner. Your name should be at the top (upper right) of each page, And, finally, these Special Assignments should not be folded.
NOTATION.

Here is a glossary of some notation that we will find useful in our excursion into elementary analysis. For more details and examples of this notation in action see the notes, “Preliminaries for Elementary Analysis.”

\[ \implies \] implies
\[ \iff \] if and only if
\[ \exists \] there exists
\[ \exists! \] there exists a unique
\[ \forall \] for all
\[ x \in S \] \( x \) is an element of the set \( S \)
\[ x \notin S \] \( x \) is not an element of the set \( S \)
\[ S \subseteq T \] \( S \) is a subset of the set \( T \)
\[ S \nsubseteq T \] \( S \) is not a subset of the set \( T \)
\[ S \cup T \] the union of the sets \( S \) and \( T \)
\[ S \cap T \] the intersection of the sets \( S \) and \( T \)
\( \mathbb{R} \) the set of real numbers
\( \mathbb{N} \) the natural numbers \( \{1, 2, 3, 4, \ldots \} \)
\( \mathbb{Z} \) the integers \( \{\ldots , -4, -3, -2, -1, 0, 1, 2, 3, 4 \ldots \} \)
\( \mathbb{Q} \) the set of rational numbers
\[ \{x \in S : P(x)\} \] the set of all \( x \) in \( S \) that satisfy the condition \( P \).
\[ \mathbb{R}^n \] the set of all \( n \)-tuples \((x_1, x_2, \ldots, x_n)\) with \( x_1, x_2, \ldots, x_n \in \mathbb{R} \).

Examples.

1. \( L = \{(x, y) \in \mathbb{R}^2 : x+y = 1\}\) is the line in the plane of slope \(-1\) and with \( y \)-intercept 1.
2. So \((2, -1) \in L \) and \((2, 2) \notin L \).
3. Now \( \exists (x, y) \in L \) with \( x \geq 0 \); for example, \((0, 1)\) and \((3, -2)\).
4. But \( \exists! (x, y) \in L \) with \( x = 5 \); namely \((5, -4)\).
5. Let \( S = \{x \in \mathbb{R} : x > 2\} \). Then \( \forall (x, y) \in L \ x \in S \implies y < 0 \).
6. Let \( M = \{(x, y) \in \mathbb{R}^2 : x - y = 2\} \). Then \( (x, y) \in L \cap M \iff (x, y) = (3/2, -1/2) \).
7. \( r \in \mathbb{Q} \iff \exists m, n \in \mathbb{Z} \) with \( m \neq 0 \) and \( mr = n \).