Study Guide for Midterm #1

30th September 2004

1. Do your homework problems. Most of the problems on the test and quizzes are like problems that I have assigned or are problems that I have assigned.

2. Inductive and Deductive logic

(a) Induction
   i. A strong argument means that the conclusion follows from the premise
   ii. If the premise is true and the argument is strong then conclusion is likely to be true.
   iii. Induction requires several specific premises to obtain a general conclusion.

(b) Deduction
   i. Valid if premises lead to conclusion
   ii. Sound if valid and premises are true.
   iii. Take general premises and get a specific conclusion.
   iv. Conditional arguments (if p then q)

(c) Venn Diagrams
   i. know how to draw Venn diagrams
   ii. know how to interpret Venn diagrams
   iii. Venn Diagrams for conditional statements
   iv. Venn Diagrams categorical statements

3. Units

(a) Units are a system to measure some quantity
(b) How to read units
(c) Unit conversion
   i. have a system to do unit conversions because I will give a nasty unit conversion on the midterm.
   ii. I will give you conversion tables for the test
iii. Be careful converting squared and cubed units
iv. I will expect you to know how to convert time without a conversion table
v. Temperature Fahrenheit, Celsius and Kelvin
   A. $F = 1.8C + 32$
   B. $K = C + 273.15$
vi. Power and Energy (joules, watts)
    vii. Metric Prefixes from milli- to kilo-
        A. use a mnemonic like the one in class
viii. Concentration

4. Problem Solving
   (a) Try to use the four steps
   (b) Do as many problems as possible. Math is like music, sports, art, writing or flying a plane; you can’t just watch people and be able to do it.

5. Percentages
   (a) Absolute Change
      i. absolute = (new or compared value) - (reference value)
      ii. relative = (absolute) / (reference value)
   (b) Percentage (Relative Change)
   (c) Absolute and Relative difference. These are the same as change with but new value is now called the compared value.
   (d) of vs. more than.
      i. of is multiply
      ii. more than is multiply and then add on to original
      iii. less than is multiply and then subtract from original
   iv. The following are all equivalent:
      A. “Hey, he got twice as many as I did. Waaaaaaaaa!”
      B. “Hey, he got 100% more than I did. Waaaaaaaaa!”
      C. “Hey, I got 50% less than he did. Waaaaaaaa!”
   (e) Percentages of Percentages
      i. absolute change in percentage points
      ii. relative change as percentage points.
      iii. Try using the four steps. This will help you get partial credit because I can give you points for things you have done.
         A. Understand the problem
B. Devise a plan
C. Carry out your plan
D. Analyze your answers. Do the make sense

(f) Problem Solving with percentages. Make sure you are comfortable with manipulating these expressions.

6. Scientific Notation

(a) Can write a number as $\pm(\#1 - 10) \times 10^m$ Where is the sign and $m$ is an integer.

(b) No how to multiply, divide, add and subtract these numbers.

(c) The $m$ from above is often called the *order of magnitude* but it is often the case that people are just refering to the general size of a number.

(d) Order of magnitude estimate
   i. get a rough estimate for the quatities involved
   ii. then add the exponents on the 10’s
   iii. multiply the number parts together
   iv. add the powers of 10 you get from the previous step onto the quatity from the second step and that is your order of magnitude.