Review

The document http://faculty.uml.edu/jpropp/2190/words.pdf ("Some words about words") contains information about math-language that I find it helpful to tell my Discrete Structures I students at the start of the semester. You should review this material at the start of the term, especially if you're shaky about the correct answer to questions like "Is 0 even?" and "Is 1 prime?"

Additionally, here is some information from Discrete Structures I that you might want to be reminded about. If later in the term you find that there are gaps in your recollection that you wish this document had filled, please let me know, and I'll include them in future versions of this document.

1. Ordered pairs, unordered pairs, sets (chapter 1)

The ordered pair (2,3) is not the same as the ordered pair (3,2). However, the unordered pair $\{2,3\}$ is the same as the unordered pair $\{3,2\}$. $\{2,3\}$ is what mathematicians call a *set* of numbers, and you are expected to recall the material from chapter 1.

In chapter 9, we use ordered pairs (i, j) for directed edges of graphs, since a directed edge pointing from vertex i to vertex j is different from a directed edge pointing from vertex j to vertex i, but we use unordered pairs $\{i, j\}$ for undirected edges of graphs, since an undirected edge joining vertex i with vertex j is the same as a directed edge joining vertex j with vertex i. Please don't write (i, j) when you mean $\{i, j\}$ or vice versa.

(Speaking of graph theory: Please note that "vertexes" and "vertice" are not correct words; the singular is "vertex" and the plural is "vertices".)

Also: The number 0 is not the same as the set \emptyset . The former is not a set; the latter is a set that happens to contain no elements (sometimes it's written as $\{ \}$). Please don't write 0 when you mean \emptyset or vice versa.

2. Logic (chapter 3)

"*P* if *Q*", "*P* only if *Q*", and "*P* iff *Q*" all mean different things; we represent them by $P \leftarrow Q$, $P \rightarrow Q$, and $P \leftrightarrow Q$, respectively. Another way to say $P \rightarrow Q$ is "*P* is a sufficient condition for *Q*". Likewise, another way to say $P \leftarrow Q$ is "*P* is a necessary condition for *Q*".

 $(\forall x)_A p(x)$ means "For all x belonging to A, the proposition p(x) is true"; it is regarded as being vacuously true when A is empty. $(\exists x)_A p(x)$ means "There exists an x belonging to A for which p(x) is true."

3. Matrix algebra (chapter 5)

You're expected to know how to add and multiply matrices. (Note that "matrixes" and "matrice" are not correct words; the singular is "matrix" and the plural is "matrices".)

4. Functions (chapter 7)

Other words for functions are map and mapping. When f is a function (which we also call a mapping or a map) from a set A to a set B, with a in A and b in B satisfying f(a) = b, we often say that f "sends" a to b, or "carries" a to b, or "maps" a to b.

Suppose f is a function from the set A to the set B. If for every b in B there is at least one a in A such that f(a) = b, we say f is onto, or surjective. If for every b in B there is at most one a in A such that f(a) = b, we say f is one-to-one, or injective. A function that is both surjective and injective is bijective.

The identity function from A to A is the function i satisfying i(a) = a for all $a \in A$. It is bijective.

5. **Propositions and sets** (chapters 3 and 4)

A major theme of Discrete Structures I is the correspondence between set theory and propositional logic. Under the correspondence between propositions on a universe and subsets of that universe, minterms correspond to minsets.

6. **Partitions** (chapter 2)

The concept of partitions (from section 2.3) plays a role in many places in Discrete II, including the discussion of connected components in Chapter 9.

7. Binomial coefficients (chapter 2)

You're expected to know how to apply binomial coefficients to solve counting problems.

8. Posets and equivalence relations (chapter 6)

The concept of partially ordered sets (from section 6.3) gets revisited in a big way in Discrete II when we study lattices and Boolean algebras in chapter 13. In particular, review Definition 6.1.5: If a and b are integers with $a \neq 0$, we say that a divides b (denoted a|b) if and only if there exists an integer k such that ak = b. Also, a big theme of Discrete II is isomorphism, and inasmuch as the relation "is-isomorphic-to" is reflexive, symmetric, and transitive, a review of equivalence relations would be helpful.

9. Other things

If you encounter mathematical words you don't remember from Discrete Structures I, use Doerr and Levasseur's index (or, if you're viewing the PDF version of the book, use your viewer's Find command). Likewise, if you encounter mathematical symbols you don't remember from Discrete Structures I, use Appendix E ("Notation") from the textbook.