CS 161 The Art of Programming – Midterm Study Guide

Chapter 1 & History of Computing lecture:

1. Know the meanings of the following terms: computer, computer science, algorithm, CPU, RAM, machine language, source code, compiler, interpreter
2. Give examples of at least three kinds of computers that use entirely different kinds of hardware

Chapter 2 & Design Lab lecture and assignment (Sept 28/29/30)

Steps in software development:

1. Analyze problem
2. Determine specifications
3. Create design
4. Implement design
5. Test / debug program
6. Maintain program

Steps in top-down design (steps 3 and 4 of above)

1. State the task
2. Determine beginning (initialization), middle (computation), and end (results) section
3. Identify main loop and stopping condition for middle section
4. Identify the subtasks to be performed inside the main loop
5. Identify "non-obvious" subtasks and break them down further
6. Turn steps into Python
7. Read code carefully to check correctness and completeness, and modify as necessary

Language features: variables, print, input, assignment

Chapter 3: Numeric computing

1. Differences between integers and floating point numbers
2. Arithmetic expressions
3. Arithmetic comparisons
4. When does Python automatically change an int into a float?
5. What are 2 ways to convert a float into an int?
6. How can write an expression that is True if and only if an integer variable X holds an even number?

Loops: for and while statements: Section 8.1 and 8.2
Boolean (true/false) expressions: Section 8.4
If statements: Sections 7.1, 7.2, and 7.3

Lists: You will only need to know the following about lists:

1. How to explicitly specify a list of items or a list of strings
2. How to select one item from a list using an index

3. What list is generated by an expression using range, e.g. range(2,8,2) (page 59-60)
4. How to use range in a for loop

Chapter 4: Strings

1. How to specify strings explicitly
2. Reading strings using raw_input()
3. String operations in Table 4.1 on page 82: concatenation, indexing, slicing, length, iteration through characters (can skip repetition).
4. How can you use a list of strings to convert a number to a string, e.g. a numeric month 11 to the string 'November'?
5. How can use that list together with a for loop and an if statement to convert a string to a number, e.g. the string 'October' to 11?
6. How to split a sentence into words using the string.split() function (page 92). You will not be asked about other functions in the string library.
7. There will NOT be questions about files or dictionaries.

Chapter 5: Objects & Graphics

1. Know the meaning of: object, method, class, constructor, video RAM, pixel
2. What do words in an video card represent? How are colors represented?
3. Where the value of X is an object, difference between Y=X and Y=X.clone().
4. How to use the graphics library functions and methods GraphWin, getMouse, draw, move, getX, getY, Point, Line, Circle, Rectangle, getCenter, setFill
5. How can you move a graphical object at an angle of D degrees?

Programming

1. Be able to write the following program: given an integer X, compute X! (X factorial)
2. Be able to write the following program: given a string containing a sentence, compute the average length of the words in the sentence.
3. Be able to write the following program: given a variable S containing a string, set the variable R to reverse of the string. You program should **not** use any string library functions. It only needs to use the operators for, range, [ ] (indexing), and + (concatenation).