**FA2017 CS 103 Introduction to Computation**

**Homework 1**

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| 1. (**7 points**) State the steps in the Methodology for Algorithmic Problem Solving as presented in class. **7** | 1. **Dialogue** 2. **Specifications** 3. **Breakdown** 4. **Define Abstractions** 5. **Write the code** 6. **Testing and Verification** 7. **Presentation** |
| 2. (**2 points**) Write the exact definition of a *computer*. **9** | **A computer is a digital electronic device that operates under the control of a stored program to process data into information.** |
| 2. (**2 points**) Write the exact definition of an *algorithm*. **11** | **An algorithm is a specific set of ordered finite steps to follow that ensures the solution to a problem.** |
| 1. (**4 points**) State the four parts of computer hardware. | 1. **Central Processing Unit (CPU)** 2. **Memory** 3. **Input Units** 4. **Output Units** |
| 1. (**2 points**) Tell why we cannot have a computer, by definition, if it does not have any memory. **17** | **Central Processing Unit (CPU) and memory make up a computer’s hardware and a computer would not function without these two things. The CPU and memory work together to run programs on the computer. The CPU executes programs while memory stores program’s data while it’s being executed. Memory can be volatile or non-volatile. Volatile memory stores information to run programs while computer is on. Non-volatile memory (ex: RAM) retains data even when computer is turned off. If a computer has no RAM, the computer would be so slow that it’s practically unusable.** |
| 1. (**4 points**) Dr. John von Neumann brought together several concepts in the middle of the last century that are still considered hallmarks in defining what is and what is not a computer. List four characteristics of what is usually considered to be a *von Neumann machine*. **21** | 1. **Use binary numbers internally** 2. **Program is stored internally along with data** 3. **Step must be executed sequentially** 4. **Electrical circuits implement logic in order to execute instructions** |
| 1. (**6 points**) Do some digging around on line to solve this one! (Be sure to cite your sources in your response.) Write three to five sentences that in your own words explain the intellectual property concepts of *copyright* and *patents*. Explain how or in what ways either of these might apply to computing topics. Also, highlight the differences between these two concepts. **27** | **A patent protects the original idea of the creator from imitators, and provides the creator with incentive to continue his line of work. Meanwhile, copyrights cover the functional expression of a work. For example, someone in the Apple App Store places a word processing app with Microsoft Word’s logo. The developer’s app has no ties to Microsoft; he is infringing on copyright law. An example of patenting in software development is the creation of a unique method for editing a video program. One big difference is that copyrights happen automatically, while patents are issued by a patent office. Patents are more expensive than copyrights. Another big difference is that a copyright usually lasts much longer than a patent.** Source: https://www.gnu.org/philosophy/software-patents.en.html |
| 1. (8 points) Suppose that you are given a programming assignment, to write a Python program which, given some input text, will count the number of consonants in that text. Step through the Methodology for Algorithmic Problem Solving, enumerating what you would do, or what you would think about, for Step 1 through Step 4. | **Step 1: Dialogue- The programmer understands the program which needs to be written.** In this case, I must write a code given string input from the user. The code must count the total number of consonants in the given string.  **Step 2: Specifications- Write down in detail about what the program can do (including pre-conditions and post-conditions).** # Program name: consonant.py #Pre-conditions: User must enter a string when prompted. If user enters a number, it is ignored. #Post-conditions: Return integer (# of consonants)  **Step 3: Breakdown- Break down the problem into pieces and handle each one.** I need to do an if c in [‘bdfghjklmnpqrstvwxz’] : then return a number. If input is not string, then return ‘input is invalid’. I could use the len(str) function to help find the number of consonants in the given string.  **Step 4: Define Abstractions- Programmer decides what data structure and process structure will be used.** |

**Total points: 27**

