Written Homework #1
CS 163: Data Structures

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1. Create an algorithm

1. I must be responsible with my timetable.
   1.1 I must not be late.
2. I must have interested about the class.
   2.1 I have to pay attention in teacher explanation.
   2.2 I must have focus and leave things that can take my attention during the class.
3. I must be organized.
   3.1 I need take notes with key words and important topics of the lecture.
   3.2 I need start do my homework some days before the due day.
4. I must continue thinking like a programmer.
   4.1 I must make an algorithm before start the code.
   4.2 I should ask oneself how to solute the problem.
   4.3 I should try to make a code that everybody can understand, even a person who doesn't know anything about programming.
5. I must read the books, documentation, and everything that can help me to improve my knowledge about the language and algorithms.
6. If I have some doubts about the lecture.
   6.1 I should read about it in the book.
   6.2 I can go to the FAB and see the assistants to clear my doubts.
7. If I have some problems with my program.
   7.1 I must try resolve alone first and think where I did a mistake.
   7.2 I should read about it in the book.
   7.3 If even after these steps I didn't find my answer, I can go to the FAB and see the assistants to clear my doubts.

2. Ethics

a. Computer ethics: Computer ethics are a group of moral rules that people linked to development of computer systems and software need to have at the moment that they are programming, building, creating and using anything which has relation with computers.

b. Plagiarism: Plagiarism in the computer field is the act of present computer codes, ideas, or any intellectual work that belongs to someone else as his. Therefore, plagiarism is totally unethical since it's way to lie.

c. Intellectual property: The intellectual property covers the rights to the discoveries, inventions, brands, etc. Therefore, intellectual property is a protection of intellectual discoveries of a person and it's directly linked with

the permission of use of the creator.

d. **Professional responsibility:** The professional responsibility is a group of behaviors and acts that a professional must have as obey the law, acting in a professional manner, respect the society and etc. Therefore, it is totally linked with the computer ethics since it's a group of moral rules.

3. Recursion

a. **Base case:** The base case of a recursion function is a break for the chain. Its can be called as a terminating case.

b. **Tail recursion:** The tail recursion is a kind of special recursion technique that makes use less memory during the process of stacking, making it faster than common recursion. In a tail recursion, it is not necessary to store the location where the call was made since the call is the last operation performed by the function.

c. **Recursion function:** A function to calculate the factorial of a number using tail recursion. This function reached the concept of dividing and conquering by the fact that the problem (Factorial of a number) was divided in small pieces until the smaller one have been reached to complete the problem and the factorial result was updated in each recursive call.

```
int tail_aux(int num, int aux)
{
  if(num == 1)            // Base case
          return aux;
  else
          return tail_aux((num - 1), (aux * num));
}

int tail_factorial(int num)
{
     return tail_aux(num , 1);
}
```

4. Data structures

We already know which node is the last node in the LLL, so we just have to scroll through the list to delete and set the previous node as the new tail.

5. Experiencing Linux

After open the file in the terminal using vim. Ex: $ vim <file_name>

a. **Copy and Paste**
   1. First we have to go to the beginner of the line that we want to copy and enter in the visual mode. Pressing the button "v" in the keyboard to enter in the visual mode.

2. After entered in the visual mode we have to select which lines we will copy. We can use the arrow buttons in the keyboard to do it.
3. With the selected lines. We must press the button “y” in the keyboard to copy.
4. Finally, we can paste the line or lines using the button “p” in the keyboard.

b. Search and Replace

1. Vim already has a command to search specific word and replace by another. It is the “:s” command and has the follow syntax: “:%s/searchword/replaceword/commandflag ”.
2. The follow command line search the word(example) and replace by the word (example_test) in the current line: “:s/example/example_test/g ”.
3. The follow command line search the word(example) and replace by the word (example_test) in the all lines: “:%s/example/example_test/g ”.

c. Undo

1. The button “u” undoes last change (can be repeated to undo preceding commands).