Homework 2 – Due Wednesday, September 27

This assignment is a sampling of some of the kinds of questions you can expect on the midterm exam. The exam will be closed book and with no calculators allowed, so as you prepare for the exam make sure you can answer the questions under those conditions! These questions cover material up through Lecture 8 and Lab 5. Over the next two weeks we will be covering some very important material that will be on the midterm (on algorithms and introducing Python programming), so don’t think this assignment is comprehensive coverage of exam topics!

1. (Short answer) In the lecture on abstraction, we talked about the two main types of abstraction. What are they? For each one, name it and give a brief one sentence description and an example (one more sentence sentence) that clearly illustrates the type of abstraction.

2. (Short answer) In Blown to Bits the authors talk about leaving digital “footprints” and digital “fingerprints”. Briefly state what they mean by footprints and fingerprints (making sure you identify how they are different), and give one example of each.

3. (Short answer) There are two distinct roles in a pair programming setting — give the name of each role along with a brief description of what the person in that role does.

4. (Base conversions) Perform the following base conversions (a table showing hexadecimal digits is to the right for your convenience):

   (a) Convert \(22\)\(_{10}\) to binary.
   (b) Convert \(21\)\(_{10}\) to binary.
   (c) Convert \(38\)\(_{10}\) to binary.
   (d) Convert \(10110\)\(_2\) to decimal.
   (e) Convert \(101011\)\(_2\) to decimal.
   (f) Convert \(110011\)\(_2\) to decimal.
   (g) Convert \(101101\)\(_2\) to hexadecimal.
   (h) Convert \(1101010\)\(_2\) to hexadecimal.
   (i) Convert \(1011110\)\(_2\) to hexadecimal.
   (j) Convert \(1A\)\(_{16}\) to binary.
   (k) Convert \(3E\)\(_{16}\) to binary.
   (l) Convert \(5C\)\(_{16}\) to binary.

\[
\begin{array}{ccc}
0000_2 &=& 0_{16} \\
0001_2 &=& 1_{16} \\
0010_2 &=& 2_{16} \\
0011_2 &=& 3_{16} \\
0100_2 &=& 4_{16} \\
0101_2 &=& 5_{16} \\
0110_2 &=& 6_{16} \\
0111_2 &=& 7_{16} \\
1000_2 &=& 8_{16} \\
1001_2 &=& 9_{16} \\
1010_2 &=& A_{16} \\
1011_2 &=& B_{16} \\
1100_2 &=& C_{16} \\
1101_2 &=& D_{16} \\
1110_2 &=& E_{16} \\
1111_2 &=& F_{16}
\end{array}
\]
5. (Writing code) Using the “hand-written Snap!” format (see class handout), sketch out a script that counts how many even numbers are in the list stored in a variable named “test list.”

6. (Writing code) Consider a situation in which a variable named “players” contains a list of names of players in a game. Write a program for Alonzo so that he says “Welcome” with each players name, for 1 second each. (Example: if the list contains names “Alice”, “Bob”, and “Carol”, then Alonzo would say “Welcome Alice” for 1 second, then “Welcome Bob” for 1 second, and finally “Welcome Carol” for 1 second.)

7. (Run the code) Look at the code for this question on the following page. What is the value of the variable “test” after this program runs?

8. (Mystery block) Describe what the block “mystery1” on the following page computes. In addition to describing what it computes in general, specifically say what value it would report if called with string “ab12cd5de7”. As in the lab quizzes, make sure your general description focuses on a high level description – do not say anything about what individual blocks or steps do when it is computing.

9. (What’s wrong) The block “bad range ...” on the following page is supposed to implement the “range ...” block that you made in Lab 5 (to create a list containing values 0 through pSize-1), but it doesn’t work correctly. What is wrong, and how could you fix it?

10. (What’s wrong) The block “bad how many” on the following page is count how many times a name (parameter pName) occurs in a list of names (parameter pList), but it doesn’t work correctly. What is wrong, and how could you fix it?
Snap! Code for Homework 2

**Code for Question 7**

- set first to $(4 \times 2 + 17 \mod 7)$
- set test to 0
- repeat first
  - change test by 2

**Code for Question 8**

- mystery1 $+$ pString $+$
- script variables: sCounter
- set sCounter to 0
- for $i = 1$ to length of (pString)
  - if is letter (i) of pString a number $?$
    - change sCounter by 1
- report sCounter

**Code for Question 9**

- $+$ bad $+$ range $+$ pSize $+$
- script variables: result
- set result to list $+$
- for $i = 1$ to pSize
  - add $i$ to result
- report result

**Code for Question 10**

- $+$ bad $+$ how $+$ many $+$ pName $+$ in $+$ pList $+$
- script variables: counter
- set counter to 0
- for $i = 1$ to length of pList
  - if Item (i) of pList $=$ pName
    - set counter to i
- report counter