

CSCE121: Introduction to Program Design and Concepts

Practice Questions for Midterm 2

February 27, 2019

- Question 1: Playing cards
- Question 2: Reverse all words
- Question 3: Printing all increasing sublists
- Question 4: Reversing a list, recursively
- Question 5: Summarizing file contents

For timing purposes: the exam would have 2 or 3 of these questions, and potentially a few multiple choice ones as well.

Remember that when you do your midterm for real, you'll not have a compiler with you. Keep track of what information you need to look up, so that you can either memorize that information, or you can add it to the pages of notes you're permitted to bring to the exam.

Question 1: Playing cards

In a standard deck of 52 playing cards, every card has a suit (*Clubs, Diamonds, Hearts, or Spades*) and is either a number card (*2–10*) or is a face card (*Jack, Queen, King, or Ace*).

In this question you need to:

1. Define your own type, `card_t`, to represent a playing card.
2. Write a function that determines returns true iff a `card_t` given as its argument is a face card.
3. Write a function that determines whether a hand of cards is a flush. The function should work for hands with n cards—you must pick some way to represent hands of cards. (A flush requires that the cards be of the same suit, but not form a sequence.)

Question 2: Reverse all words

Given a string we wish to reverse the individual words in the string. If we were given the following string:

“Here’s a one-off example! Hello world.” then, as output, we ought to produce:

“s’ereH a ffo-eno elpmaxe! olleH dlrow.”

Sequences comprising of letters of the alphabet, numeric digits, the apostrophe, ampersand, and the hyphen characters all form words; any other characters do not. Complete the function `rev_words` below. You may assume that any additional functions you define can be called from it (i.e., that their declarations appear before it).

```
void rev_words(char input[])
```

Question 3: Printing all increasing sublists

If you were given the list of integers $\langle 1, 3, 2 \rangle$, then enumerating all the sublists would give the following: $\langle 1, 3, 2 \rangle$, $\langle 1, 3 \rangle$, $\langle 1, 2 \rangle$, $\langle 1 \rangle$, $\langle 3, 2 \rangle$, $\langle 3 \rangle$, $\langle 2 \rangle$, $\langle \rangle$. An increasing list $\langle x_0, x_1, \dots, x_k \rangle$ has $x_i < x_{i+1}$ for all $i \in \{0, k - 1\}$. If we wanted only the increasing non-empty sublists, then the previous eight would get trimmed to just these five: $\langle 1, 3 \rangle$, $\langle 1, 2 \rangle$, $\langle 1 \rangle$, $\langle 3 \rangle$, $\langle 2 \rangle$.

Write a C++ function to print out all the non-empty increasing sublists of a given input array.

```
void all_increasing_sublists(int list[], int n)
```

Question 4: Reversing a list, recursively

Given an array of integers, write a function which changes the input so that the integers now appear in reverse order. The objective here is to do this via **recursion**. You should be able to do it using only the input array and without making any new array of values.

The following is an appropriate declaration for the function.

```
void rev_list(int input[], int num)
{ // Takes input, a list with num entries
  // Alters input so that the entries are in reverse order
```

Question 5: Summarizing file contents

In this question, you are asked to read in and process a file consisting of multiple lines where each line contains a valid single English word. On the left is an example input file containing such lines; on the right is the desired output for this question (as would be printed to the screen via `cout`):

```
ape
jolly
axe
bicycle
hippopotamus
poetess
angle
trumpet
```

```
Shortest word has 3 letters: ape
Longest word has 12 letters: hippopotamus
The average word length is 6.1250
The mode word length is 6
```

Find the shortest and longest words, and report them. If there are length ties, print the first instance (as has been done for “ape” above). Furthermore, you need to compute the average and mode word lengths as well. (Recall: the mode is the most frequent among some data; the average is a standard arithmetic mean.)

Use `char []`s to represent the strings.

Fact: The longest English word, pneumonoultramicroscopicsilicovolcanoconiosis, has 43 letters.

END OF THE PRACTICE QUESTIONS