

CSCI 570 Practice Quiz 1 Summer 2016

Last (family) Name	
Rest of Name	
ID	

DO NOT OPEN EXAM UNTIL INSTRUCTED TO DO SO

SILENCE MOBILE PHONE AND OTHER DEVICES

PLEASE READ THE COVER CAREFULLY

- You are allowed to have one normal-sized page of hand-written notes.
- You may not have any other materials available to you other than those used for writing.
- You will have 60 minutes, from **2:30 PM** until **3:30 PM**, to work on the real exam.
- When answering any given question, use only the page on which the question is printed.
- If you leave your seat without permission of a proctor, you may be required to submit your exam without any further changes.
- If you give multiple answers to a free-response question and do not clearly indicate which one you wish to be graded, we reserve the right to select which one to grade.
- The grader may elect to read only a portion of unnecessary long answers.
- Please keep this cover page and the question pages intact.
(You may remove the scratch paper from the end if you would like)

Question	Points	Possible
1		10
2		10
Total		20

1. The Center for Disease Control works to model and prevent the spread of epidemics. For a recent outbreak of flu, they have a list of infected individuals in the United States. We represent this by a graph: one vertex for each individual and a directed edge (a, b) is placed between two people if they had contact at a time when a was infected and b was not yet infected (thus a might have transmitted the flu to b).

Describe how you'd determine if the data is consistent about when people were infected.

2. A spy is deep undercover in the hostile country of Phonemia. In order to not waste scarce resources, any time she wants to send a message back home, she removes all the punctuation from the message and converts all the letters to uppercase. So, for example, to send the message,

“Abort the plan! Meet at the Dark Cabin.”

she would transmit

ABORTTHEPLANMEETATTHEDARKCABIN

Given such a string S , of n uppercase letters, give an efficient **dynamic programming** algorithm to determine if it is possible to break it into a sequence of valid English words. You may assume that you have a function, `valid(·)`, which can take a character string s (or a prescribed range of another string, if you prefer) and returns **true** if and only if s is a valid English word.

You do not need to worry about the *intent* of the message – simply if at least one way to break it up is possible. For example, if your input string is “THEYOUTHEVENT,” most English-speakers would recognize this as intending “the youth event,” however “the you the vent” would be acceptable for this question.

Provide the recursive solution (including the base case), explain *briefly* why it is correct, and state what the running time of the iterative algorithm would be.

You *do not* need to give the iterative algorithm, nor do you need to produce the list of words that would provide “proof” that a “yes” answer is correct for cases when it is.

Extra page. You may use this for scratch paper, but nothing on this page will be graded.