THE UNIVERSITY OF BRITISH COLUMBIA
CPSC 100: MIDTERM EXAMINATION – October 4, 2016

Full Name: _____ Exam ID: ____

Signature: _____ UBC Student #: ____

Important notes about this examination

1. You have **80 minutes** to write this examination.
2. This is a closed book, closed notes exam. No books or other material may be used.
3. Answer all the questions on this paper. Give very short but precise answers. State any assumptions you make.
4. Work fast and do the easy questions first. Leave some time to review your exam at the end.
5. Good Luck!

Student Conduct during Examinations

1. Each examination candidate must be prepared to produce, upon the request of the invigilator or examiner, his or her UBCcard for identification.
2. Examination candidates are not permitted to ask questions of the examiners or invigilators, except in cases of supposed errors or ambiguities in examination questions, illegible or missing material, or the like.
3. No examination candidate shall be permitted to enter the examination room after the expiration of one-half hour from the scheduled starting time, or to leave during the first half hour of the examination. Should the examination run forty-five (45) minutes or less, no examination candidate shall be permitted to enter the examination room once the examination has begun.
4. Examination candidates must conduct themselves honestly and in accordance with established rules for a given examination, which will be articulated by the examiner or invigilator prior to the examination commencing. Should dishonest behaviour be observed by the examiner(s) or invigilator(s), pleas of accident or forgetfulness shall not be received.
5. Examination candidates suspected of any of the following, or any other similar practices, may be immediately dismissed from the examination by the examiner/invigilator, and may be subject to disciplinary action:
   i. speaking or communicating with other examination candidates, unless otherwise authorized;
   ii. purposely exposing written papers to the view of other examination candidates or imaging devices;
   iii. purposely viewing the written papers of other examination candidates;
   iv. using or having visible at the place of writing any books, papers or other memory aid devices other than those authorized by the examiner(s); and,
   v. using or operating electronic devices including but not limited to telephones, calculators, computers, or similar devices other than those authorized by the examiner(s)—(electronic devices other than those authorized by the examiner(s) must be completely powered down if present at the place of writing).
6. Examination candidates must not destroy or damage any examination material, must hand in all examination papers, and must not take any examination material from the examination room without permission of the examiner or invigilator.
7. Notwithstanding the above, for any mode of examination that does not fall into the traditional, paper-based method, examination candidates shall adhere to any special rules for conduct as established and articulated by the examiner.
8. Examination candidates must follow any additional examination rules or directions communicated by the examiner(s) or invigilator(s).

Please do not write in this space:

Question 1: ____

Question 2: ____

Question 3: ____

Question 4: ____

Question 5: ____

1 2 3 6 4 1 3 0 4 8 9 2 9

Exam ID: __ __ __

Problem 1: Multiple Choice – circle the correct answer [4 marks]

i. Select which of the following answers has the terms from the types of memory in order from Smallest to Largest Capacity?

   a. Disc Storage, Physical Ram, Level 2 & Level 1 Cache, CPU Registers

   b. CPU Registers, Physical Ram, Disc Storage, Level 2 & Level 1 Cache

   c. Physical Ram, Disc Storage, CPU Registers, Level 1 & Level 2 Cache

   d. Physical Ram, CPU Registers, Level 2 & Level 1 Cache, Disc Storage

   e. CPU Registers, Level 1 & Level 2 Cache, Physical Ram, Disc Storage

ii. In Snap, which of the following statements is most correct?

   a. All snap blocks can have further snap blocks attached to them

   b. You must place at the start of your code a green flag block in order to test your code

   c. You can assign a variable by asking the user a question

   d. All of the above

   e. None of the above

iii. Among the following, what best describes Phishing?

   a. Something that someone is trying to sell to you through the internet

   b. An e-mail sent to the user, asking for his/her personal information wherein the sender poses to be a legitimate source

   c. Messages that a server sends to your browser when visiting a website

   d. All of the above

iv. Which of the following is a correct definition of computer cookies?

   a. Cookies are small files stored in a user's computer that are used by the user to store information about the server

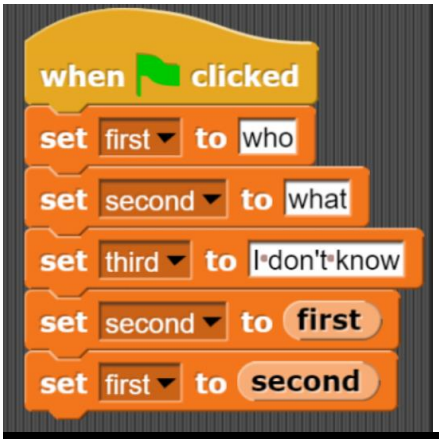
   b. Cookies are small files stored in the server that are used by the server to store information about the user

   c. Cookies are small files that the user cannot access that are used to store information about the user

   d. Cookies are small files stored in a user's computer that are used by the server to store information about the user

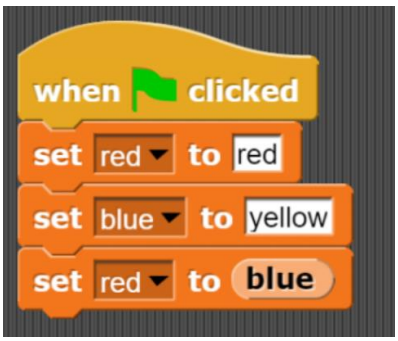
Problem 2: Fun with variables [5 marks]

a. What are the final values stored in the variables **first**, **second**, and **third** and after the following code fragment has executed?



Variable	Value
First	
Second	
Third	

b. What are the final values stored in the variables **red** and **blue** after the following code fragment has executed?



Variable	Value
Red	
Blue	

Problem 3: Orange is the new black [2 points]

Consider the following real world case. Judges and police officers in the US use software to predict the likelihood of people committing crimes in the future. This software has been shown to be biased against African-Americans.

Should the people who were designing this software have considered race when testing the software? Why or why not?

Problem 4: Fox in Socks [7 Marks]

In class we talked about sorting. One of the motivations for sorting was that it improved searching. It helps other operations as well. In this problem, we will investigate a little bit about how much it helps.

Suppose that you wanted to find the intersection of three lists (i.e., which words appear on all three lists). Here are three lists to use:

List 1
Box
Knox
Socks

List 2
Knox
On
Socks

List 3
Box
In
Knox

Here are two algorithms to use:

Procedure *Intersect Unordered Lists*
General idea: exhaustively check all possibilities
Assumption: (Input lists are in *any* lexicographic order (i.e., don't have to be alphabetical)***:***

1. Put a marker/arrow at the start of each list
2. If markers point to the same item, save it
3. Move marker of the rightmost list down by one
4. If the marker at the rightmost list is at the end of the list **and** the markers for both other lists are not at the end
   Move the marker for the rightmost list to the top
   If the marker for the middle list is at the bottom
   Move the marker for the middle list to the top **and** move the marker for the leftmost list down by one
   else
   Move the marker for middle list down by one

   (e.g., if the markers are on "Box", "Knox", and "Knox" for the three lists respectively, then you should set the markers to "Box", "On", and "Box")
5. Repeat 2-4 until all markers are at the end of the list

Procedure *Intersect Alphabetized Lists*
General idea: pass through each list once
Assumption: (All input lists are in alphabetic (= lexicographic) order**):**

1. Put a marker/arrow at the start of each list
2. If all markers point to the same item, save it, because they are the same item
3. Move the marker(s) to the next position for whichever item is the earliest in the alphabet
   (e.g., if the markers are on "Box", "Knox", and "Box", respectively, then the markers should be moved to "Knox", "Knox", and "In" respectively)
4. Repeat Step 2-3 until some marker reaches the end of the list

For the purposes of this question, assume that you can compare one item in each list at the same time (e.g., comparing "Socks" in list 1 with "Socks" in list 2 with "Knox" in list 3 is one comparison).
You may also assume that determining which marker to move does not require a comparison.

Please answer the questions on the following page

This page references the information on the previous page

a. What words are in the intersection of the three lists?

b. For the given lists, how many comparison steps does it take to check and see what the full set of intersections is for Intersect Unordered Lists? Give a short explanation (about a sentence long) as to your reasoning.

c. *For the given lists*, how many comparison steps does it take to check and see what the full set of intersections is for Intersect Alphabetized Lists? Give a short explanation (about a sentence long) as to your reasoning.

d. Is there any situation in which it would be better to use Intersect Unsorted Lists over Intersect Alphabetized Lists?

Problem 5: Understanding URLs and their components [6 points]

Consider the following URL:

http://www.npr.org/sections/alltechconsidered/2015/03/23/394827451/now-algorithms-are-deciding-whom-to-hire-based-on-voice

Please answer the following questions:

a. What is the protocol for this URL?

b. What is the top level domain name for this URL?

c. Is the above webpage secure? Why or why not?

d. Is http://news.npr.org likely to be run by the same organization as the above URL? Why or why not.