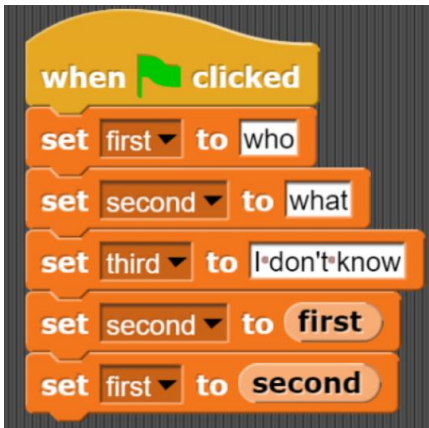


Problem 1: Multiple Choice – circle the correct answer [4 marks]

- i. Select which of the following answers has the terms from the types of memory in order from Smallest to Largest Capacity? [Peerwise question 2280197, modified slightly](#)
- 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? [Peer wise question 2277662](#)
- 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? [Peerwise question: 2279962](#)
- 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? [Peerwise question 2279146](#)
- 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

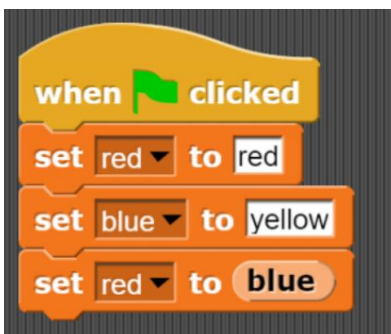
Problem 2: Fun with variables [5 marks]

- 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	<u>who</u>
Second	<u>who</u>
Third	<u>I don't know</u>

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



Variable	Value
Red	<u>yellow</u>
Blue	<u>yellow</u>

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?

Yes, considering sensitive information is the only way to make sure that the information is being handled appropriately. (see the Dwork reading: http://www.nytimes.com/2015/08/11/upshot/algorithms-and-bias-q-and-a-with-cynthia-dwork.html?_r=1&abt=0002&abg=0)

[grade 0 1 2 – A good explanation and “yes” answer gets 2 points. A “yes” answer with no or poor explanation gets one point. A “no” answer with no or poor explanation gets no points. A “no” answer with a good explanation gets 1 point]

Comes from a number of articles, including <http://theweek.com/articles/627570/many-prison-inmates-futures-depend-racially-biased-algorithms>

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. (this problem is motivated by Fluency pages 280-285)

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

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

Knox

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.

Exhaustive search requires checking all combinations, so $3*3*3 = 27$.

2 points. One for correct answer, one for 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.

One to check Box, Knox, Box

Then move the marker from “Box” in lists 1 and 3. Check Knox, Knox, In.

Move the marker from “in” to “Knox” on list 3.

Done. 3

2. points. One for correct answer, one for reasoning

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

Yes: if the lists are not sorted. Another acceptable answer would be yes if the lists are not sorted and it would be too slow to sort them.

[grade 0 1 2 – A good explanation and “yes” answer gets 2 points. A “yes” answer with no or poor explanation gets one point. A “no” answer with no or poor explanation gets no points. A “no” answer with a good explanation gets 1 point]

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?

http

(it's fine to include the : or the //)

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

org (it's fine to have the .)

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

No. It is not secure because it does not have an https; it's unencrypted would also be an acceptable answer

[grade 0 1 2 – A good explanation and “no” answer gets 2 points. A “no” answer with no or poor explanation gets one point. A “yes” answer with no or poor explanation gets no points. A “yes” answer with a good explanation gets 1 point]

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

Yes, because both end with npr.org, which is at the end of the domain

[grade 0 1 2 – A good explanation and “yes” answer gets 2 points. A “yes” answer with no or poor explanation gets one point. A “no” answer with no or poor explanation gets no points. A “no” answer with a good explanation gets 1 point]