

PART 1: Multiple Choice Questions

Circle the letter(s) corresponding to the correct answer(s).

1. Select all of the following that are examples of computational thinking applications.
 - A. Abstraction
 - B. Decomposition
 - C. Moore's law
 - D. Data mining**
 - E. Sorting Algorithms
 - F. Computer animation**

2. Select all of the following statements that are true
 - A. Registers are very large and very fast to access
 - B. The largest stores of data exist on the CPU
 - C. Cache is slow memory that exists on the chip
 - D. RAM is bigger than cache and is faster to access than data on the hard drive**
 - E. Hard drive is on the motherboard and is very slow to access

3. Select all of the following statements about sorting algorithms that are not true. Note. That we define space as memory slots needed and we are assuming the average case.
 - A. Merge Sort is faster than Selection Sort
 - B. Simple Sort uses more space than Insertion Sort
 - C. Simple Sort will take longer than Selection Sort.
 - D. Selection Sort uses less space than Insertion Sort**

4. Select all of the following statements that are not true about programs and programming
 - A. A program will execute exactly in the order that it is written.
 - B. A variable does not need to be defined before it is used**
 - C. Programs are a way of encoding algorithms in a precise enough way for computers to understand the instructions
 - D. In Snap, sprites send information to each other through broadcast
 - E. Most programs are written in machine code so that they can be used on different machines**

5. In the context of classification, select all the statements below that are true
- A. It is not necessary to measure the accuracy of the classifier if the training data accurately represents the population.
 - B. Training data is the data that classifiers learn the patterns from and it has the correct grouping.**
 - C. The data must always be split 50 – 50 for training and test data to avoid bias.
 - D. It is not necessary to measure the accuracy of the classifier if the test data accurately represents the population.
 - E. Classifiers are derived from patterns from the test data.

PART 2: Short Answer Questions

Use the following to answer questions 6 to 8.

Let's imagine a world where movies were borrowed at a local store. As an employee of the local DVD rental store, you are charged with arranging the highest rated movies of all time in a display case. Let's consider a case in which you need to swap the three movies that are on display and change it from last week's arrangement to the arrangement for this week.

Last Week's Arrangement

Slot	Initial Value
1	Black Panther
2	Sound of Music
3	Titanic

Arrangement for this week

Slot	Desired Value
1	Sound of Music
2	Titanic
3	Black Panther

6. What is the minimum number of **swap spaces** you need to update the arrangement?

one

0.5 if they say four

7. What would your algorithm be? Your algorithm should include steps like:

1. Move DVD in slot 1 to slot 2 etc

1. Move Black Panther from slot 1 to the swap space

2. Move Sound of Music from slot 2 to slot 1

3. Move Titanic from slot 3 to slot 1

4. Move Black Panther from the swap space to slot 3

5. _____

Grading: 0 if blank or totally wrong. 1 point if major error or more than one minor error. 2 points if only one minor error. 3 points if totally correct. Note: there may be more than one correct algorithm! Also note that we have NOT said that they have to have the minimum number of swaps.

8. Regardless of the number of swap spaces, what is the minimum number of swaps that are needed to perform this operation?

four

9. What is one strength of writing programs in high-level programming languages?

easy to write, portability, readability, easy to fix, can be used on different machines

10. Abstraction is used in defining patterns and generalizing from instances. It is used to let one object stand for many.

11. Computational thinking involves solving problems, designing systems, and understanding human behavior, by drawing on the concepts fundamental to computer science.

12. If you were sorting 5 cards, in descending order, on average, how many comparisons are needed using the Selection Sort algorithm discussed in class?

10

13. If you were sorting 5 cards, in ascending order, how much space is needed to sort the cards when using the Simple Sort algorithm discussed in class?

10

14. Translator/Compiler/Interpreter/Assembler takes a high-level programming language and translates it into something the computer can understand, regardless of which high-level language is used.

PART 3: Longer-form Question

Use the space provided below to answer the each question. Your answers do not have to be long. Suggested length 2 – 4 sentences.

- 15.** In the context of algorithms, what does the phrase “garbage in garbage out” refer to and give at least 2 real-world examples

4 points

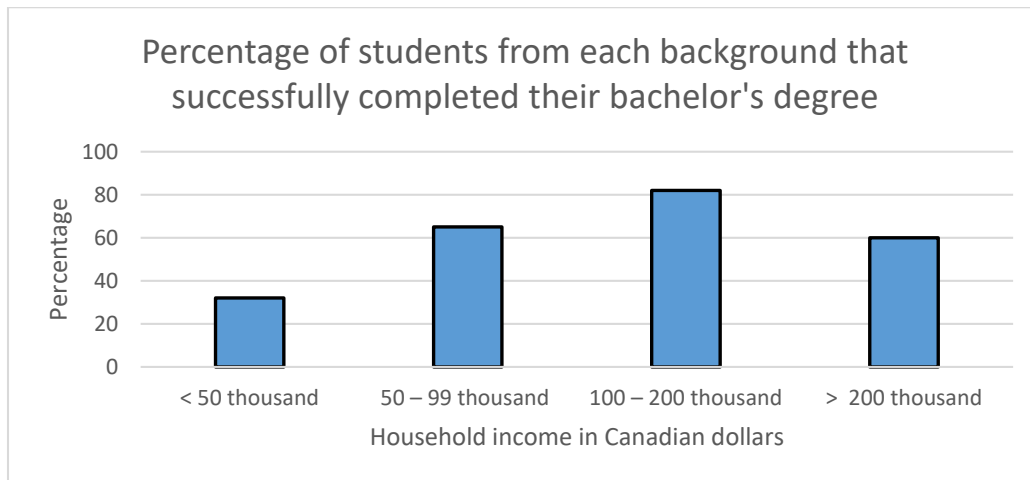
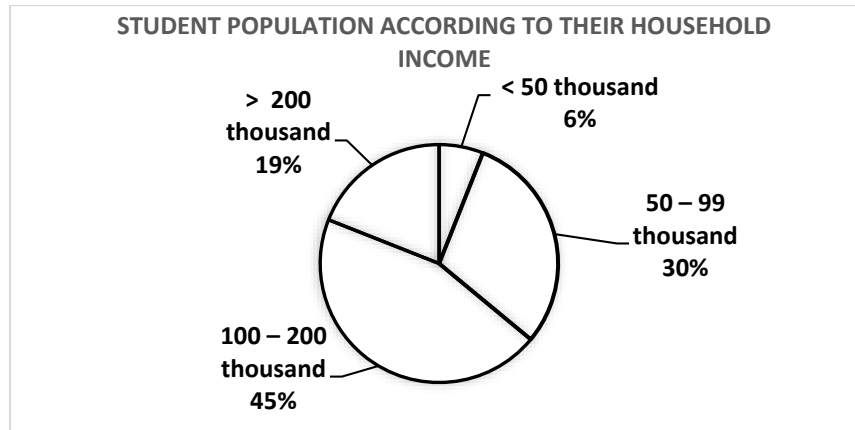
2 pts - Students answer must mention training data and how it influences the algorithm that is produced

1 point for every example

- loan data that is not truly representation of the population
 - identification of people algorithm for Google that doesn't truly represent the population
 - searches on google that are based on the clicks of people, malicious Bush data
 - health data that doesn't truly represent the population
-
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- 16.** In the year 2020, attending university in Canada is free but each school only accepts a limited number of students each year. Students are only admitted into university if they are deemed likely to succeed. To help aid the admission process a software is being developed. The software currently uses historical enrollment data (from 1990 – 2015) and student's high school exit exam scores to determine the likelihood of success. The data shown in the pie chart and bar chart span 1990 – 2015. The pie chart shows the make up of the student population by household income. The bar chart shows the graduation rates for each group. For instance, between 1990 – 2015, 65% of students whose parents' income was between 50 and 100 thousand successfully completed their degree.

Should the people who are designing the software have considered socio-economic status when testing the software? Why or why not?



Yes, considering the socio-economic status is the only way to prevent certain inequalities from persisting. The sensitive information is the only way to make sure that the information is being handled appropriately (see Dwork article). The student population only has 6% of people from household's earning <50 thousand. Does this mirror Canada in general, if not this is a clear indication that the university student population does not represent the breakdown of incomes seen in the general public.

A good explanation and “yes” answer gets 4 points, if they include the student population data in their response.

If they don't include the student population data in their response they only get 3 points.


A “yes” answer with no or poor explanation gets 1 point.

A “no” answer with a good explanation gets 2 points

A “no” answer with no or poor explanation gets 0 points.

PART 4: Tracing Through Snap Programs

When asked about the output, you do not need to indicate the number of seconds the message is displayed on the screen. Just write down the message in the space provided.

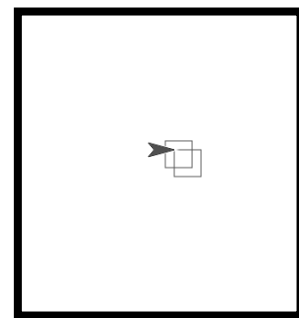
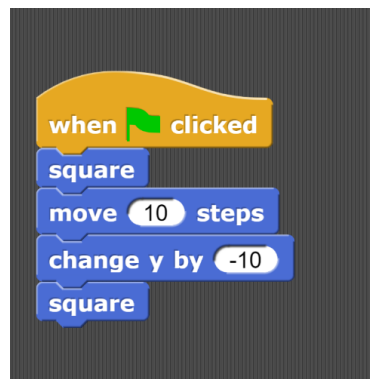
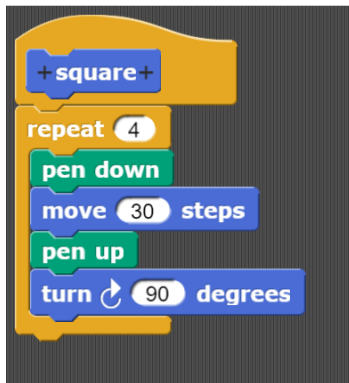
17. Given the two blocks below, what is the output when  is clicked? Draw your answer in the black box.


1 point for each square (2)

2 points for the overlap

2 point for the overlap in the right direction

They don't need to include the Sprite




18. Given the two blocks below, what is the output when  is clicked?

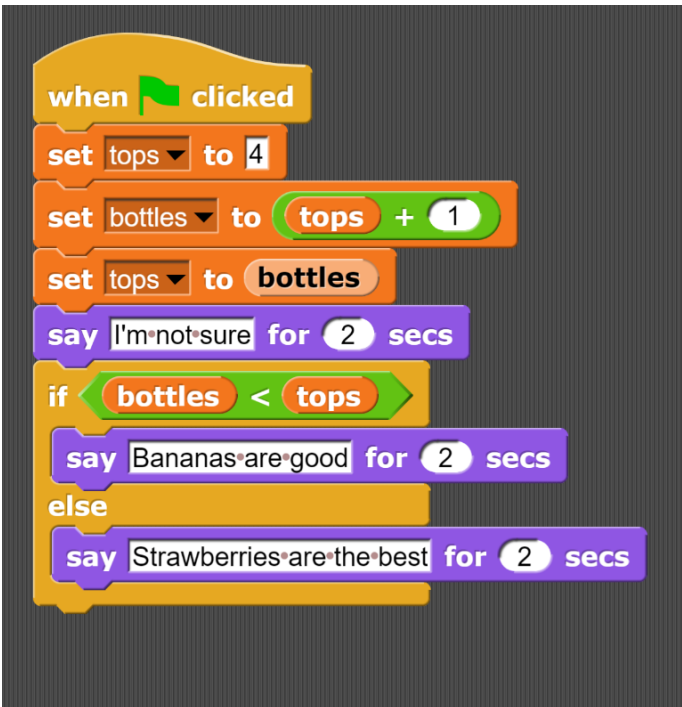
2 point for WALK, 0 otherwise



Walk


19. What is the output when  is clicked?

1pt for each line - 1 if they have the word say or if they have an additional output

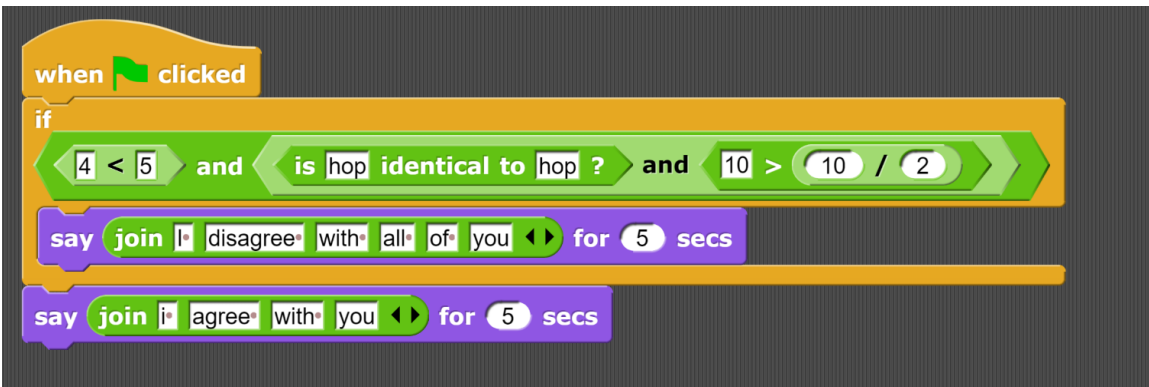


___ I'm not sure ___

___ Strawberries are the best ___

20. What is the output when  is clicked?

1 pt for each line

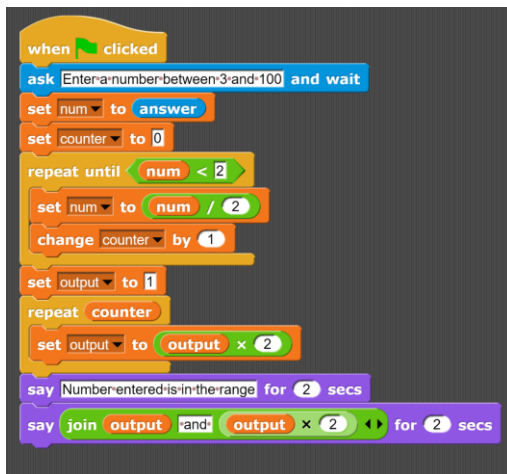


_____ I disagree with all of you _____

_____ I agree with you _____


___ If they include the join word then subtract one point _____

Use the block below for the next 4 questions




21. What kind of loop is the repeat loop? 2 points


_____count controlled_____

22. When  is clicked, if the user input is 9, how many times does the repeat until loop run?

_____3_____

23. When  is clicked, if the user input is 17, how many times does the repeat until loop run?

_____4_____

24. What is the output when  is clicked and the user has input 17 as the answer?

_____Number entered is in the range _(1 pt)_____

_____16 and 32_____ (2 points)

If they include the join word then subtract one point