PART 1: Multiple Choice Questions

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

1. 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. Selection sort uses less space than Insertion Sort**
   - C. Simple Sort uses more space than Insertion Sort
   - D. Simple Sort will take longer than Selection Sort.

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

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

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

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

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	Mission Impossible

Arrangement for this week

Slot	Desired Value
1	Sound of Music
2	Mission Impossible
3	Black Panther

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

   <u>One</u>
   0.5 if they say four

7. [3 marks] What would your algorithm be?
   Your algorithm should include steps like:
   1. Move DVD in slot 1 to slot 2 etc

   1. <u>Move Black Panther from slot 1 to the swap space</u>
   2. <u>Move Sound of Music from slot 2 to slot 1</u>
   3. <u>Move Move Mission Impossible from slot 3 to slot 2</u>
   4. <u>Move Black Panther from swap space to slot 3</u>

   <u>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.</u>

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 disadvantage of coding in assembly language?

_____ Hard to fix, Hard to debug, it is more closely tied to the architecture,

_____

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

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

10 spaces_____

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

___ 10 comparisons_____

13. Translator/Compiler/Interpreter/Assembler _____takes a high level language and translates it into something that looks about the same, regardless of which high level language is used.

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

PART 3: Longer-form Questions

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
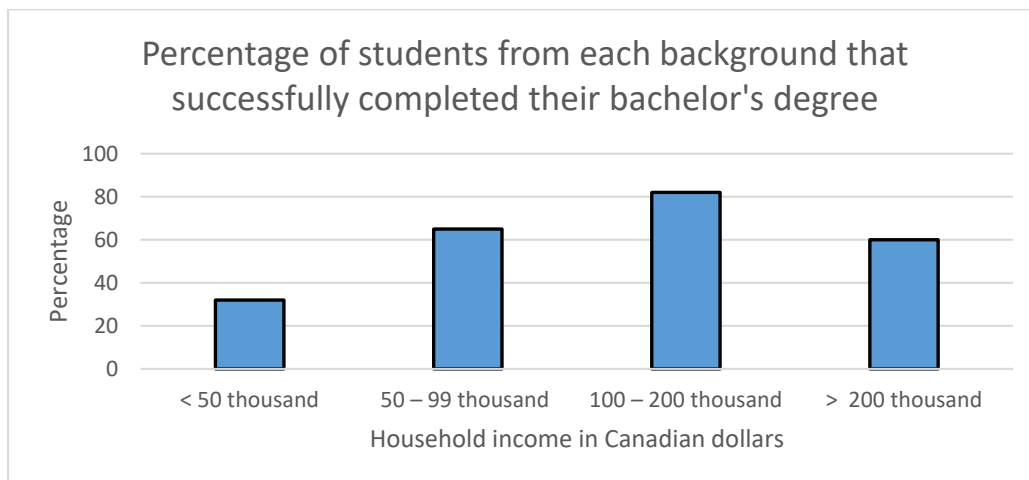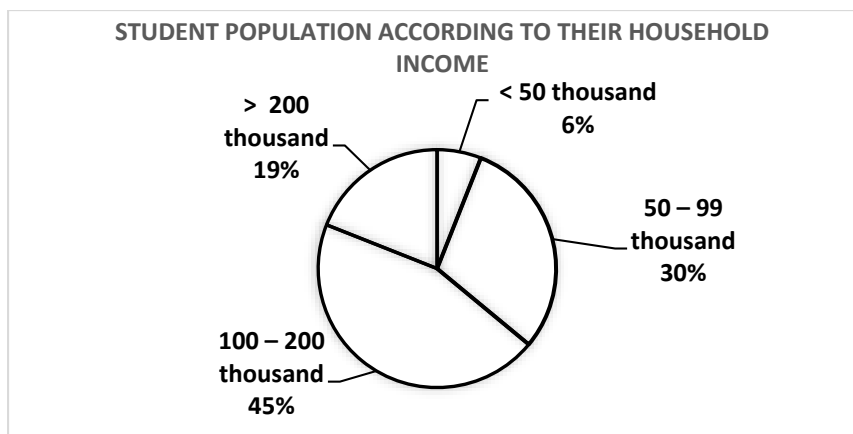
4 points
2 pts - Students answer must mention training data and how it influences the algorithm that is produced
1 point for every example
- loan data that is not truly representation of the population
- identification of people algorithm for Google that doesn't truly represent the population
- searches on google that are based on the clicks of people, malicious Bush data
- health data that doesn't truly represent the population

_____

_____

_____

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?

STUDENT POPULATION ACCORDING TO THEIR HOUSEHOLD INCOME

> 200 thousand
19%

< 50 thousand
6%

50 – 99 thousand
30%

100 – 200 thousand
45%

Percentage of students from each background that successfully completed their bachelor's degree

Percentage (y-axis: 0, 20, 40, 60, 80, 100)

Household income in Canadian dollars:
< 50 thousand, 50 – 99 thousand, 100 – 200 thousand, > 200 thousand

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.
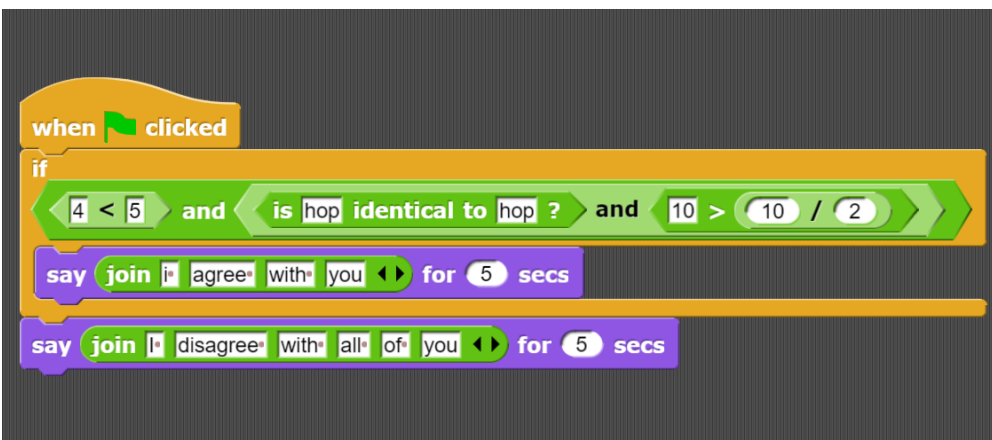
17. What is the output when 🚩 is clicked?
    1pt for each line - 1 if they have the word say or if they have an additional output
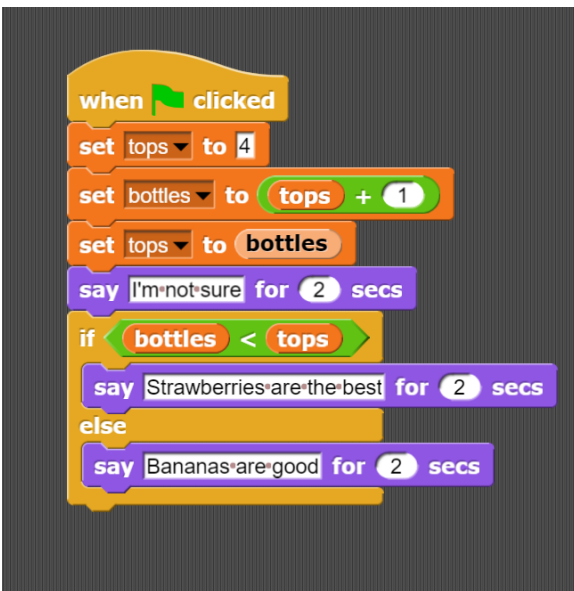
_____I'm not sure_____

__Bananas are good_____

_____

_____

18. What is the output when 🚩 is clicked?

_____I agree with you_____(1pt)_____
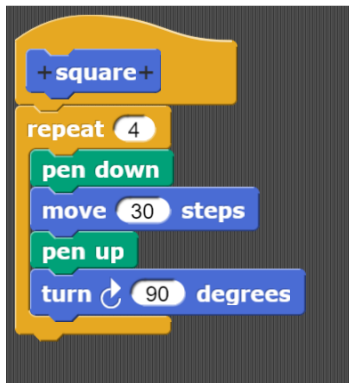
_____I disagree with all of you (1pt)_____

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

19. Given the two blocks below, what is the output when 🏳 is clicked?
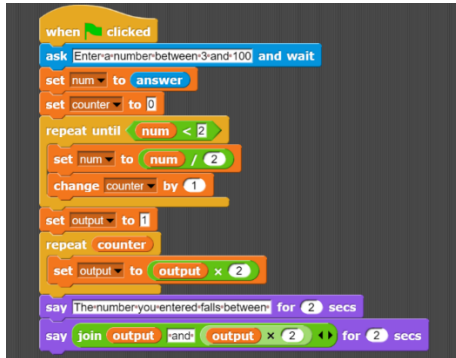**2 point for WALK, 0 otherwise**
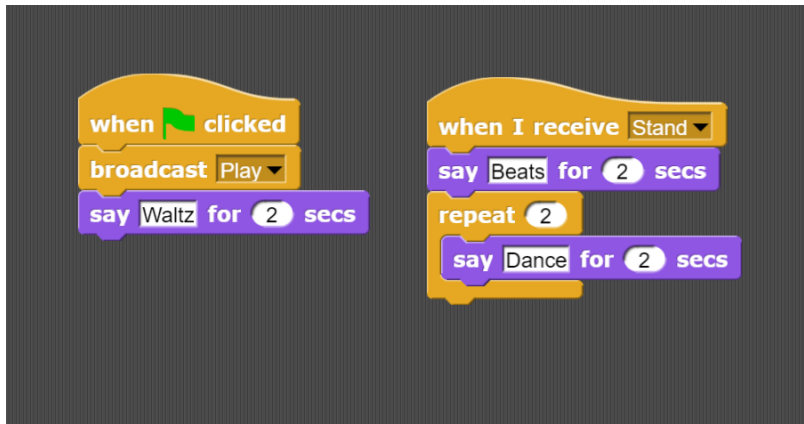
___Waltz_____

_____

_____

_____

20. Given the two blocks below, what is the output when 🏳 is clicked?
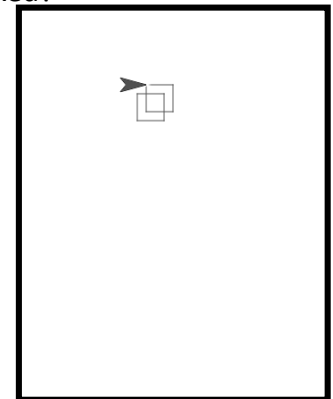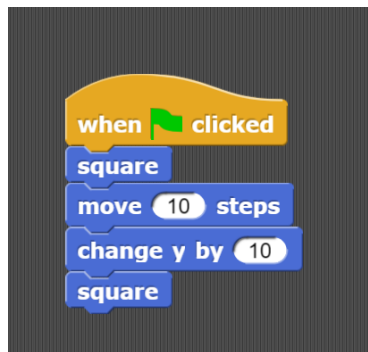
They don't need to include the Sprite
1 point for each square (2)
2 points for the overlap
2 point for the overlap in the right direction
They don't need to include the Sprite

Use the block below for the next 4 questions

21. What kind of loop is the repeat until loop?

_____Event controlled loop_____

22. When 🚩 is clicked, if the user input is 7, how many times does the repeat until loop execute?

_____2_____times _____

23. When 🚩 is clicked, if the user input is 21, how many times does the repeat until loop run?

_____4 times _____

24. What is the output when 🚩 is clicked and the user has input 21 as the answer?

_____Enter a number between 3 and 100_____(this line is optional no grade for it)____

_____The number you entered falls between (1 point)_____

_____16 and 32_____(2 points)_____
If they include the join word then subtract one point