Fill in the Blank [5 marks]

Question	The word that should go into the blank
In class, we discussed four types of memory. _____ is the slowest type of memory.	
The _____ translates assembly language to machine code.	
Snap is an example of a _____ type of programming language.	
Computers store information about colour by representing each colour as _____ hexadecimal digits.	
In CPSC 100, students form project groups with other students in their lab section. Carmen is trying to assign a project TA to each group. To help figure out an algorithm to do this, she decides to only look at the project groups from one lab section instead of looking at all the project groups. This is an example of _____.	

Short Answer [10 marks]

1. [2 marks] Each midterm exam has an exam number (found at the top right hand corner of your exam). Arden has randomly grabbed ten exams from the box. Specifically, she is looking at a pile of exams with numbers: 100, 480, 232, 123, 533, 355, 182, 234, 142, and 800. She remembers that she needs to double check exam #533 to see if the cover page was filled out by the student. Without doing anything else to the pile, should she use a linear search or binary search method to find exam #533? Why? Provide a 1 to 3 sentence explanation in the box below.

2. If you were asked to rank ice cream flavours from best to worst:
    a. [0.5 marks] Is an example of an ambiguous or unambiguous task? Circle your answer.

        Ambiguous Unambiguous

    b. [1.5 marks] Why?

3. [2 marks] Name two differences in the way snow looked between Beauty and the Beast and Monsters Inc.

   Difference 1:

   Difference 2:

4. [1 mark] Why do images get blurrier the more we use lossy compression on it?

5. [2 marks] Recall the quicksort algorithm discussed in the CS Field Guide Chapter 2. In the worst case possible, would quicksort or selection sort have fewer comparisons when sorting six cards from smallest to largest? Why?

6. [1 mark] Draw the image shown by the following bitmap image representation (the representation given follows the conventions described in lecture).
FFFFFF is white, 000000 is black.

   2x3
   FFFFFF 000000 000000 FFFFFF FFFFFF 000000

Algorithms [10 marks]

1. [6 marks] Given a bitmap image, write an algorithm that would create a compressed data representation that stores information by columns. Assume you have a table that tells you the hexadecimal representation of a particular colour.

   For example, given the bitmap image below (the colours listed in the box are meant to represent what colour that pixel is), your algorithm should produce:

White	White	Black
Black	Black	Black
White	Black	White

   (number of columns) x (number of rows)
   A description of the colours in each column starting from the leftmost column and moving from top to bottom.

   Specifically, the image to the left would produce a representation like this:
   3x3
   FFFFFF 1 000000 1 FFFFFF 2 000000 4 FFFFFF 1

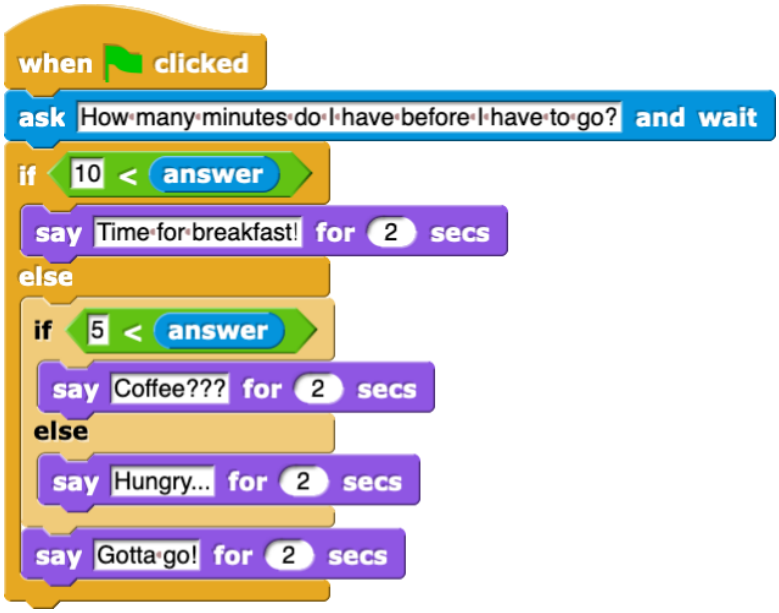
   The bitmap image can contain colours other than black and white.

   The answer space given for this question is not indicative of how long your algorithm should be. It is just given in case you require more space.

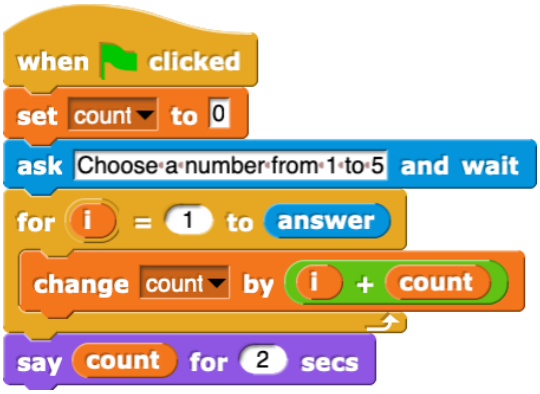
2. [4 marks] Karin is currently debating about whether she should continue to work on her current task. Using the process we discussed in class, create a decision tree that will help her make a decision.

Is there a new episode of her favourite show?	Is she working with other people?	What is the weather like?	Do task?
Yes	No	Snowy	No
Yes	No	Rainy	Yes
No	No	Snowy	Yes
No	Yes	Sunny	Yes
Yes	Yes	Snowy	No
No	No	Sunny	No
Yes	Yes	Sunny	Yes
No	Yes	Rainy	Yes
Yes	Yes	Rainy	Yes

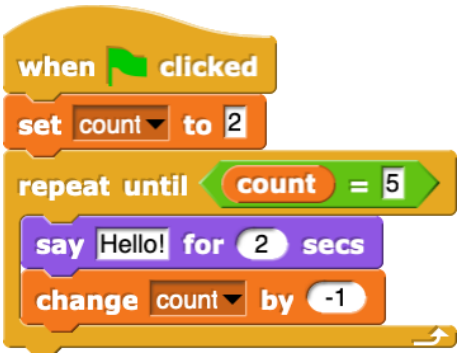
Trace Through the Code [10 marks]



User Answers With...	Sprite Says
15	
8	

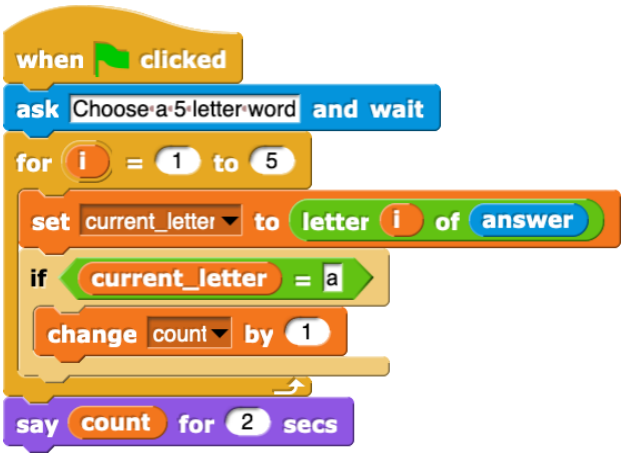


[2 marks] If user answers with 3, the sprite will say:



[2 marks] **Sprite Says**

[2 marks] Using 1-2 sentences, describe what the following code snippet is doing. Note that answers that describe what the code is doing line by line will not be given any marks.



Number Conversions [6 marks]

For each of the following questions, you don't have to show your work but in the case where your answer is wrong, there is some possibility (although not guaranteed) of obtaining part marks based on your work. The conversion table exists on the last page of the exam.

Question	Answer
[1 mark] 0x342 to decimal. For this question, you can also show the mathematical equation you would use to calculate the answer. E.g., (2 x 6) + (2 x 3)	
[1 mark] 0b1010110010 to hexadecimal	
[2 marks] 238 to hexadecimal	
[2 marks] 197 to binary	

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If you need to write an answer here, please clearly indicate which question the answer belongs to. You should also write a note by the question to let the person grading your work know that your answer is on this page.

Information you may find useful. This sheet will **NOT** be graded.

Powers of 2

2 raised to the power of	
0	1
1	2
2	4
3	8
4	16
5	32
6	64
7	128
8	256
9	512

Powers of 16

16 raised to the power of	
0	1
1	16
2	256
3	4096

Hexadecimal Digits

Binary Representation	Hexadecimal Representation
0000	0
0001	1
0010	2
0011	3
0100	4
0101	5
0110	6
0111	7
1000	8
1001	9
1010	A
1011	B
1100	C
1101	D
1110	E
1111	F

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Do NOT write any answers from your exam on this sheet. We will be separating this page from the exam prior to scanning so any answers written on here will be lost.