

## Information you may find useful

### Powers of two

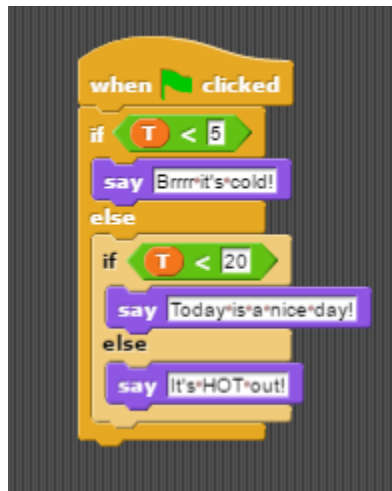
$2^9$	$2^8$	$2^7$	$2^6$	$2^5$	$2^4$	$2^3$	$2^2$	$2^1$	$2^0$
512	256	128	64	32	16	8	4	2	1

### Hexadecimal digits

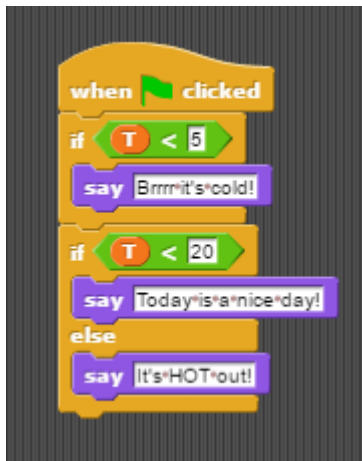
Binary representation	Decimal representation	Hexadecimal representation
0000	0	0
0001	1	1
0010	2	2
0011	3	3
0100	4	4
0101	5	5
0110	6	6
0111	7	7
1000	8	8
1001	9	9
1010	10	A
1011	11	B
1100	12	C
1101	13	D
1110	14	E
1111	15	F

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

- i. When do most experts think that superintelligence will arrive?
- a. In the next 10 years
  - b. In the next 10-25 years
  - c. In more than 25 years
  - d. never
- ii. What is the best way of combining these DNA sequences?
- 1.GTTAA
  - 2.AACGT
  - 3.TCCGA
  - 4.GAACG
- a. TCCGAACGTTAA
  - b. GTTAACGTCCGAACG
  - c. GTTAACGTCTGAACG
  - d. All of the above
  - e. None of the above
- iii. If I had a bag of beans that were all different sizes and I wanted to know how many small beans I have, which of the following would be the better solution for my question?
- Solution A:** Take a bean out of the bag. If the bean is small, then put the bean down and increment the current value of the number of small beans. If the bean is big, then put the bean down. Repeat all the steps until the bag is empty.
- Solution B:** Take a sieve that allows all smaller beans to pass through while trapping the big beans. Pour all the beans from the bag into the sieve and count all the beans that pass through the sieve.
- a. Both solutions are equally good as they both manage to do what we want.
  - b. Solution A is better because it can find our solution faster.
  - c. Solution B is better because it can find our solution faster.
  - d. Both solutions are bad.



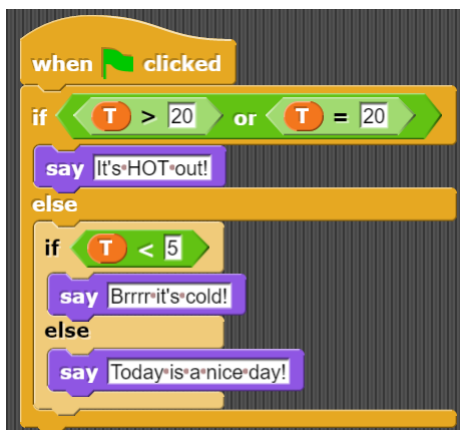
iv. Circle the algorithm that is equivalent to the one above



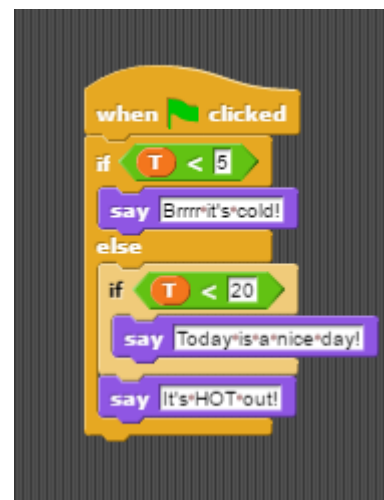
a.



b.



c.



d.

e. None are equivalent.

## Problem 2: True or False [4 marks]

Circle the correct answer to each question

Newer methods of automatic language translation attempt to translate entire sentences at once.	True	False
Most of the improvements in the cost of assembling genomes has been from hardware speedups	True	False
An association rule $X \rightarrow Y$ holds with support sup% if sup% of transactions that contain X also contain Y	True	False
It is possible to have an election system that has independence of irrelevant alternatives and does not result in a dictator	True	False

**Problem 3: Define this [6 marks]**

Expand the following acronyms to their full version as discussed in class. Note that adding additional definitions may result in your losing points. No need to provide anything beyond just listing the expansion of the acronym. E.g., if the question was “URL” the answer should be “Uniform Resource Locator”.

a. DOS attack

b. DNS

c. ML

d. NLP

e. OS

f. RAM

#### Problem 4: Decision Tree Algorithm [3 marks]

Assume that you have the following data and you are trying to make a decision tree to decide whether or not you should keep studying or not.

New Netflix	Weather	Next exam	Study?
Westworld	Snowy	Tomorrow	Yes
Mr. Robot	Rainy	Next week	Yes
Westworld	Sunny	Tomorrow	Yes
Mr. Robot	Snowy	Two weeks	No
Westworld	Rainy	Next week	No
Mr. Robot	Sunny	Next week	Yes
Mr. Robot	Snowy	Tomorrow	Yes
Mr. Robot	Rainy	Two weeks	Yes
Mr. Robot	Sunny	Next week	No
Dr. Who	Snowy	Tomorrow	Yes
Westworld	Rainy	Next week	No
Dr. Who	Sunny	Next week	Yes

Which is the best first column to split on based on the method we discussed in class? Why?

### **Problem 5: Number conversion [4 marks]**

[2 marks] Translate the following decimal number to binary: 343

[2 marks] Translate the following hexadecimal number to decimal: A866

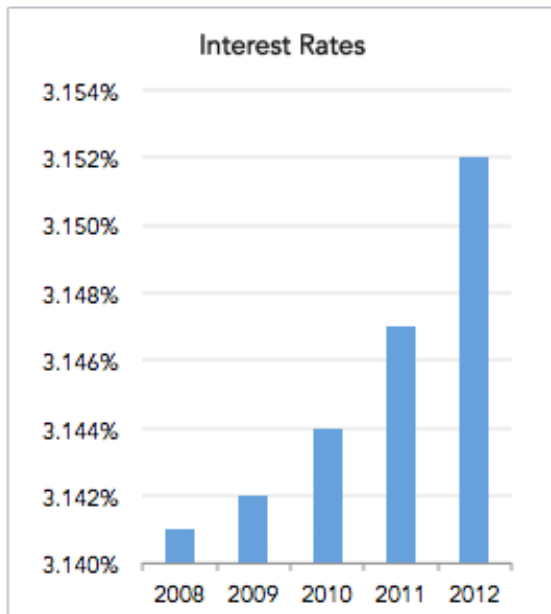
### Problem 6: Artificial Intelligence [3 marks]

- a. What is an argument from lecture or the reading against the claim that artificial intelligence will lead to higher levels of unemployment?
  
  
  
  
  
  
  
  
  
  
- b. List of responsibilities of data entry clerks:
  - Read source documents such as checks, sales reports, or bills
  - Operate data entry device, such as keyboard or scanner
  - Compile, sort, and verify data
  - Compare data with source documents
  - Preparing materials for printing
  - Report errors
  
- a. What in the list of responsibilities are computers currently capable of undertaking?
  
  
  
  
  
  
  
  
  
  
- b. Based on the number of tasks that computers are currently able to do, is it likely that this job will be automated in the next 20 years?



## Problem 7: Visualization [8 marks]

- a. [2 marks] Is this graph misleading? Why or why not?



- b. [2 marks] Which is more appropriate for showing the current population of English native speakers, a line chart or a pie chart? Why?
- c. [2 marks] If you want to find out how you did relative to your classmates in an exam, which would you use: mean, median, or mode? Why?
- d. [2 marks] What are two factors that we covered in class that you should consider when presented with an infographic or statistic?

### Problem 8: In brief [6 marks]

- a. [2 marks] You are going to the website <https://connect.ubc.ca> . You notice that to log on it took you to <https://shibboleth.id.ubc.ca> Should you click? Why or why not?
- b. [1 mark] Why can the time for an Internet packet to get from one computer to another vary?
- c. [1 mark] What is an application of bioinformatics as discussed in class?
- d. [1 mark] What are potential reasons to use a database as covered in class?
- e. [1 mark] Give one technological reason presented in class why quantum computing is not likely to be coming to your laptop any time soon.

## Problem 9: Image Representation [3 marks]

a. [1 mark] What is the difference between lossless and lossy compression?

b. [2 marks] Which of the following affects the size of an image file? (circle all that apply)

Length of the image

Width of the image

Bit depth

Type of computer you use to save the image

Number of colours present in an image

Type of file

Amount of detail

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Note that we will *not* grade this page. You must copy your answer to the appropriate spot on the exam for it to be graded.