FAILURE TO COMPLETELY FILL THE TOP PART OF THIS PAGE WILL LOSE 2%

THE UNIVERSITY OF BRITISH COLUMBIA

CPSC 100: FINAL EXAMINATION – DEFERRED EXAM WINTER 2 2019

Full Name: _____ Exam ID: ____

Signature: _____ UBC Student #: _____

Important notes about this examination

1. You have **150 minutes** to complete this examination.
2. This is a closed book, closed notes exam. No books or other material may be used.
3. Answer all questions on this paper. Give very short but precise answers. State any assumptions you make.
4. Work fast and do the easy questions first. Leave some time to review your exam at the end.
5. Put away books, papers, laptops, calculators, cell phones… everything but pens, pencils, erasers and this exam.
6. Good luck!

Student Conduct during Examinations

1. Each examination candidate must be prepared to produce, upon the request of the invigilator or examiner, his or her UBCcard for identification.
2. Examination candidates are not permitted to ask questions of the examiners or invigilators, except in cases of supposed errors or ambiguities in examination questions, illegible or missing material, or the like.
3. No examination candidate shall be permitted to enter the examination room after the expiration of one-half hour from the scheduled starting time, or to leave during the first half hour of the examination. Should the examination run forty-five (45) minutes or less, no examination candidate shall be permitted to enter the examination room once the examination has begun.
4. Examination candidates must conduct themselves honestly and in accordance with established rules for a given examination, which will be articulated by the examiner or invigilator prior to the examination commencing. Should dishonest behaviour be observed by the examiner(s) or invigilator(s), pleas of accident or forgetfulness shall not be received.
5. Examination candidates suspected of any of the following, or any other similar practices, may be immediately dismissed from the examination by the examiner/invigilator, and may be subject to disciplinary action:
   i. speaking or communicating with other examination candidates, unless otherwise authorized;
   ii. purposely exposing written papers to the view of other examination candidates or imaging devices;
   iii. purposely viewing the written papers of other examination candidates;
   iv. using or having visible at the place of writing any books, papers or other memory aid devices other than those authorized by the examiner(s); and,
   v. using or operating electronic devices including but not limited to telephones, calculators, computers, or similar devices other than those authorized by the examiner(s)—(electronic devices other than those authorized by the examiner(s) must be completely powered down if present at the place of writing).
6. Examination candidates must not destroy or damage any examination material, must hand in all examination papers, and must not take any examination material from the examination room without permission of the examiner or invigilator.
7. Notwithstanding the above, for any mode of examination that does not fall into the traditional, paper-based method, examination candidates shall adhere to any special rules for conduct as established and articulated by the examiner.
8. Examination candidates must follow any additional examination rules or directions communicated by the examiner(s) or invigilator(s).

Please do not write in this space:

PART 1: Write the letter that corresponds to the correct answer in the space provided. You will ONLY be graded on the letter written and not on the circles made on the question. Each question is worth 1 point.

_____ 1. Which of the following statements is not true about computing systems?
   A. An operating system is a special kind of software that enables other software to run
   B. Software is typically written in a language that computers can understand
   C. Recent computing advances are solely due to Moore's law
   D. The chip (i.e., central processing unit) is a part of the computer that is responsible for executing operations

_____ 2. Which of the following statements is true about programming?
   A. High level programming languages can only be understood by one operating system
   B. Assembly language can be used on different computer architecture
   C. It is difficult for humans to program in machine code
   D. Snap is an example of an assembly language
   E. Scratch is an example of a machine language

_____ 3. When building a classifier, if the training data is biased in some way then
   A. The test data is biased in the opposite way
   B. The test data is biased in the same way
   C. The test data is unbiased
   D. The biasing of the test data and the training data is not related
   E. The test data will be fair

_____ 4. Which option best describes the color represented by the hexadecimal code: #A11F9F?
   A. A shade of red
   B. A shade of blue
   C. A shade of green
   D. A shade of purple
   E. A shade of black

_____ 5. Which of the following visual representations does not utilize position on a common axis?
   A. Bar Chart
   B. Parallel Coordinates
   C. Network Graph
   D. Radar Chart
   E. Star Plot

_____ 6. In visual representations when comparing items, shading is more accurate than which of the following

A. Length
B. Angle
C. Area
D. Color saturation
E. Curvature

_____ 7. Suppose you are sending an email, which is broken into packets for transmission over the internet. Which of the following statements is not true?

A. Each packet can take a different route
B. The packets may arrive out of order
C. Some packets may not arrive at all
D. None of the above

_____ 8. What component is the file in https://canvas.ubc.ca/courses/cpsc_100.png

A. courses
B. canvas.ubc.ca
C. https
D. cpsc_100.png

_____ 9. What helps direct data packets to the right destination?

A. A computer
B. A router
C. A modem
D. A circuiter
E. A memory parser
F. A residential switch

_____ 10. How do neurons in ANN work?

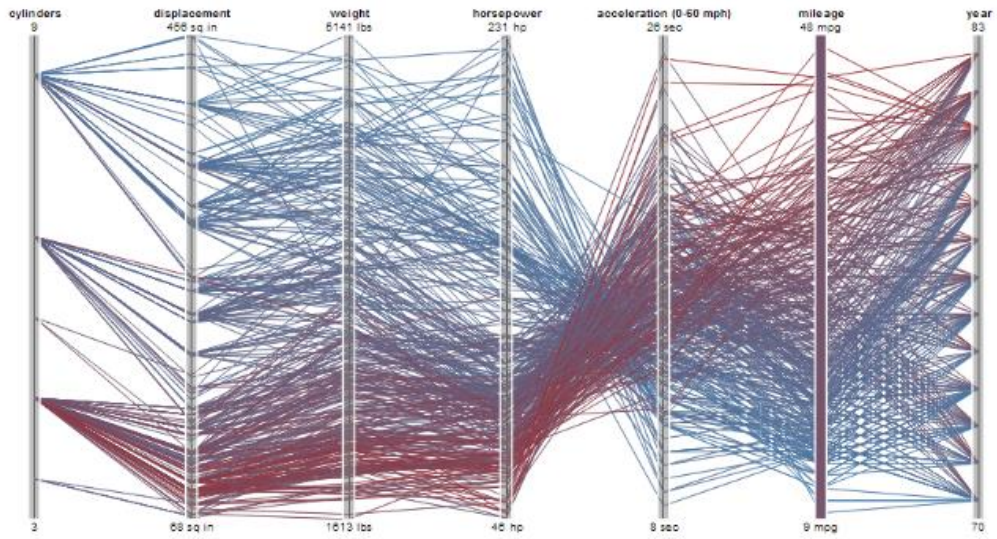
A. They use neural electrons to solve translation problems
B. They solve one tiny function and pass the result on to another neuron
C. They duplicate the functionality of biological neurons exactly
D. All of the above

PART 2: Write the answer in the space provided. Each question is worth 2 points.

11. _____ requires inferring meaning from contextual information.

12. _____ is used in defining patterns, generalizing from instances, and parameterization. It is used to let one object stand for many.

13. What is the name of the visual representation below? _____



14. _____takes a high-level programming language and translates it into something the computer can understand, regardless of which high-level language is used.

Use the URL below to answer Questions 15 and 16
https://www.cbc.ca/radio/spark/366-smelling-data-competing-for-amazon-and-more-1.4340869/getting-emotional-about-online-privacy-1.4341986

15. _____ is the top level domain name for the URL

16. _____ is the top level (i.e., root) folder for the URL

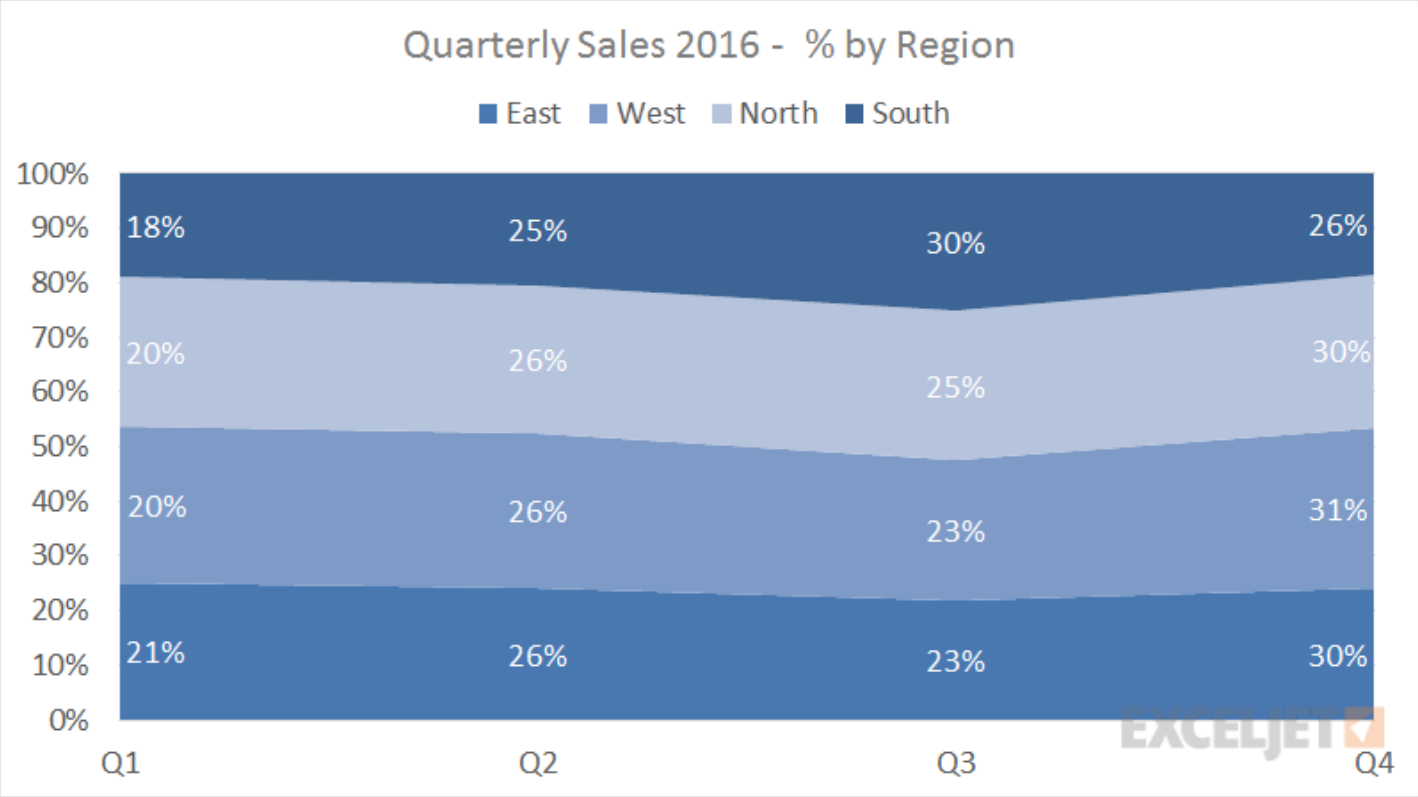
17. _____ is the activity of defrauding an online account holder of financial information by posing as a legitimate company.

18. In animation, _____ is the process of filling in frames between key frames.

19. Let's say that instead of having a base 2 number system, we have a new type of system where each digit represents 5 symbols, how many symbols can we represent with 3 digits?

_____

20. What is the name of the visual representation below? _____



PART 3: Short Answer Questions

Write the answer in the space provided.

21. [3pts] Compare and contrast the Selection Sort and Simple Sort algorithms

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22. [4pts] **List four theories** as to why there is a lower percentage of women in computer science when compared to other disciplines.

_____

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23. [4pts] Convert 0x10F to decimal

_____

24. [4pts]Convert decimal 250 to hexadecimal

_____

25. [3pts] What information does a TCP/IP packet contain?

_____

_____

26. [3 pts] What is representation effect and why does it matter

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_____

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27. [3 pts] What are two limitations of static visualizations

_____

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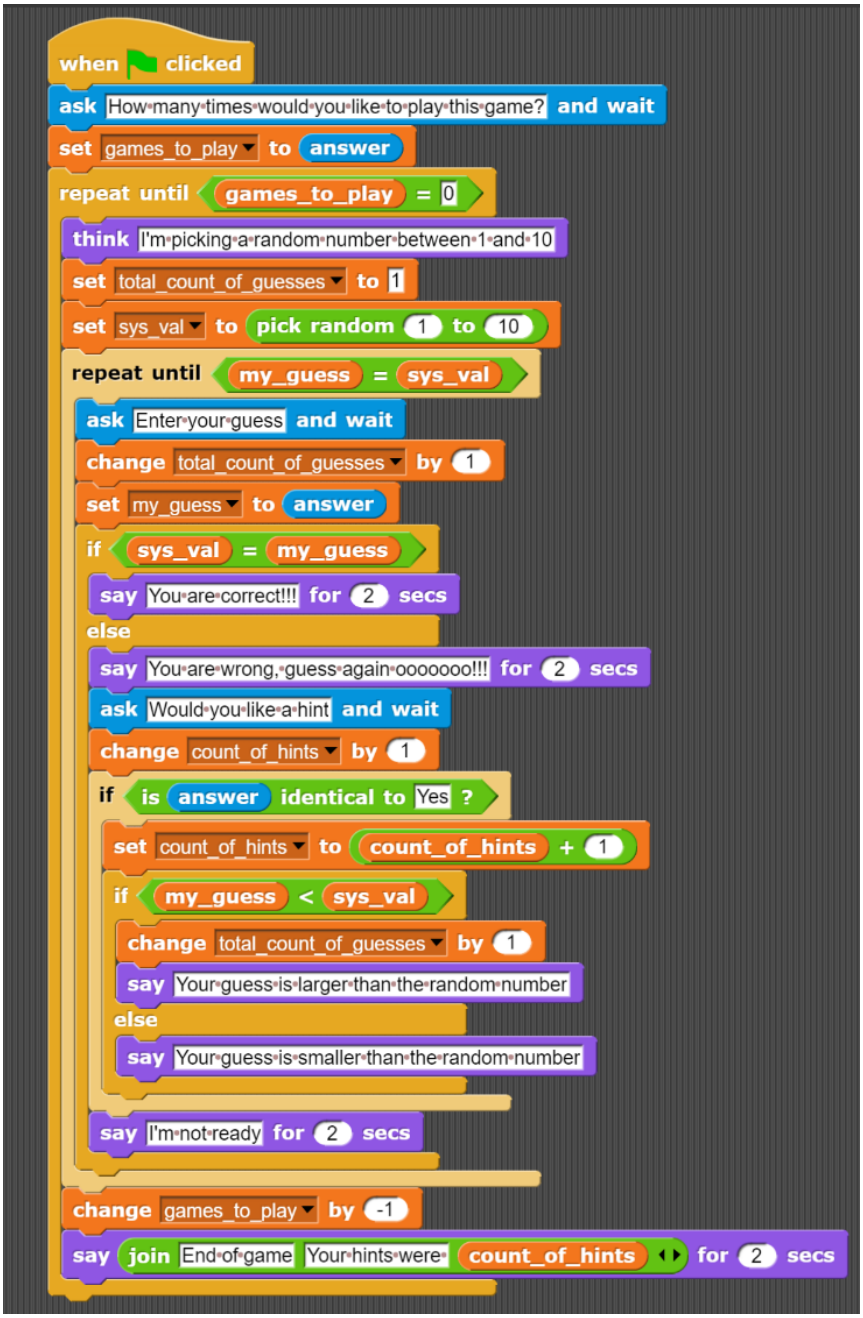
Use the snap program shown to answer Questions 28 – 30



28. [1pts] If the user enters 3 for the number of times they would like to play the game. What is the final value in total_count_of_guesses if the user guesses the correct number on the first try for each round of the game?

_____

Let's consider the case where the user enters 2 for the number of times they would like to play the game. For Question 29 you should write what will be displayed to the screen for the first round of the game. For Question 30 you should write what will be displayed to the screen for the second round of the game.

29. [5pts] What would be displayed to the screen (don't include the questions), if for the first round of the game, the random value was 4, and the user guesses were 5 and 8, and then they asked for a hint and then provided the right answer (i.e. 4)?

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30. [2pts] What would be displayed to the screen (don't include the questions) if for the second round of the game, the random value was 8, and the user guessed correctly on the first try?

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31. [3pts] What are two advantages of using ANN to address real-world problems?

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32. [4 pts] Give two situations where vector representation of data might be a better choice than bitmap representation

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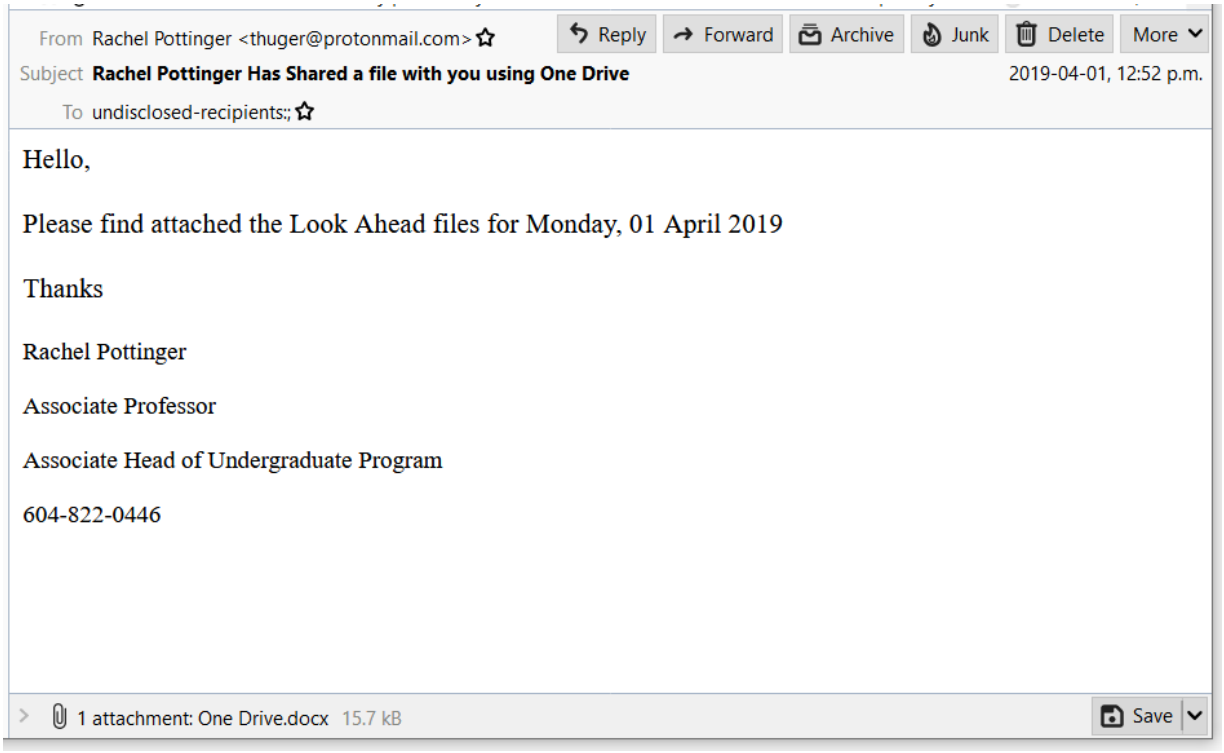
PART 4: Real World Applications

Write the answers in the space provided.

33. [4pts] Below is a screenshot of an email I received.
For some context, Rachel Pottinger is an Associate Professor and Associate Head of Undergraduate Program in the computer science department here at UBC.



Should I download the attachment?

_____

Write out three reasons to support your answer

_____

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Use the scenario below for the next 4 questions

Your cousin Ani is trying to decide whether a semester abroad is the best course of action. Ani interviewed 16 UBC students who have done a semester abroad, but is not sure what to do with all the data he collected. The table below shows the highlights of the notes collected by Ani.

- Level: student's level in university, where 1 represents first year and so on
- Faculty: faculty in which the student's family
- Income: household income for the student and their guardians/parents
- Language: proficiency/fluency of the student in the language of the foreign country in which they studied
- Advice: advice the student gave Ani based on their experiences

Level	Faculty	Income	Language	Advice
1	Arts	Below $250,000	Advanced	Stay here
2	Arts	Below $250,000	Basic	Stay here
2	Arts	Below $250,000	Medium	Go abroad
3	Arts	Above $250,000	Basic	Go abroad
3	Arts	Below $250,000	Basic	Stay here
4	Arts	Above $250,000	Advanced	Go abroad
4	Arts	Below $250,000	Basic	Go abroad
1	Science	Above $250,000	Basic	Stay here
2	Science	Above $250,000	Advanced	Go abroad
2	Science	Above $250,000	Medium	Go abroad
2	Science	Below $250,000	Medium	Go abroad
3	Science	Below $250,000	Basic	Stay here
3	Science	Above $250,000	Medium	Stay here
3	Science	Above $250,000	Medium	Stay here
4	Science	Above $250,000	Basic	Go abroad
4	Science	Below $250,000	Medium	Go abroad

34. [8pts] Use the data provided to create a decision tree using the approach presented in class.

35. [1pts] Ani speaks a little Italian (basic fluency), and is a third year Arts student. Your uncle and aunt (his parents) have a household income of one hundred and seventy thousand dollars each year, would it be a good idea (based on his research) for him to study in Italy next year?

_____

36. [6pts] Now that you have helped your cousin make a good decision, you start to think of other UBC students who might be struggling with this same decision. You decide to create an app, and reach out to a friend in Computer Science who has some experience in making Android apps. Write out the algorithm that you need to provide your friend with (that is based on the decision tree created). The app should ask the student for all the relevant data and then let them know whether they should study abroad next year or stay at UBC.

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37. [2pts] Your app is a raving success and within the first week you have 5000 downloads. Thinking about all that we have covered in class this year, what is one limitation of your current application and how should you fix it?

_____

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_____

38. [3pts] For the infographic shown below,
Name **one gestalt principle** that the infographic uses

_____

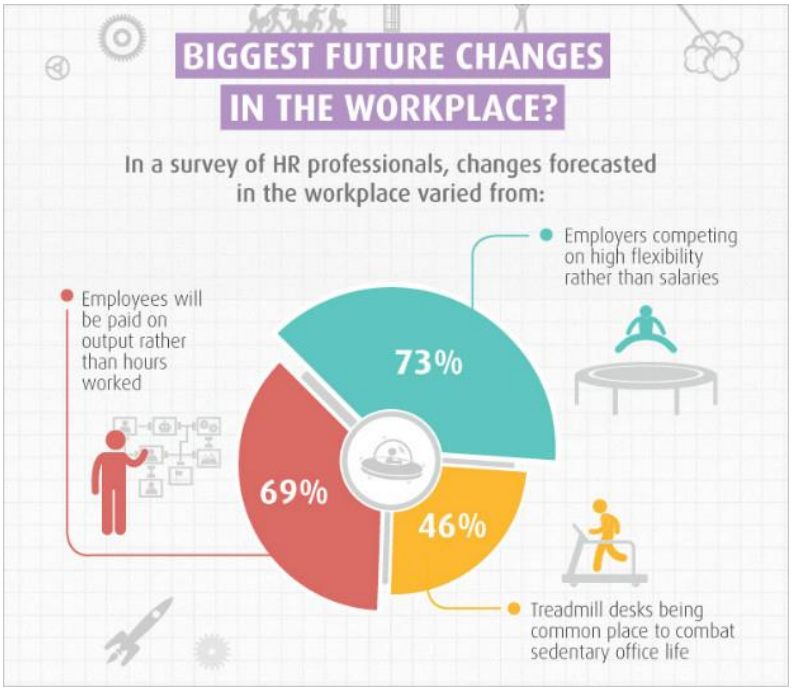
What is **one problem** with the infographic below?

_____

Based on your previous answer, what **one change** would improve the infographic?

_____

_____



39. [3pts] Given the infographic below, **name one principle** that the infographic violates.

_____

Explain how the infographic violates the principle you wrote above.

_____

_____

_____

_____

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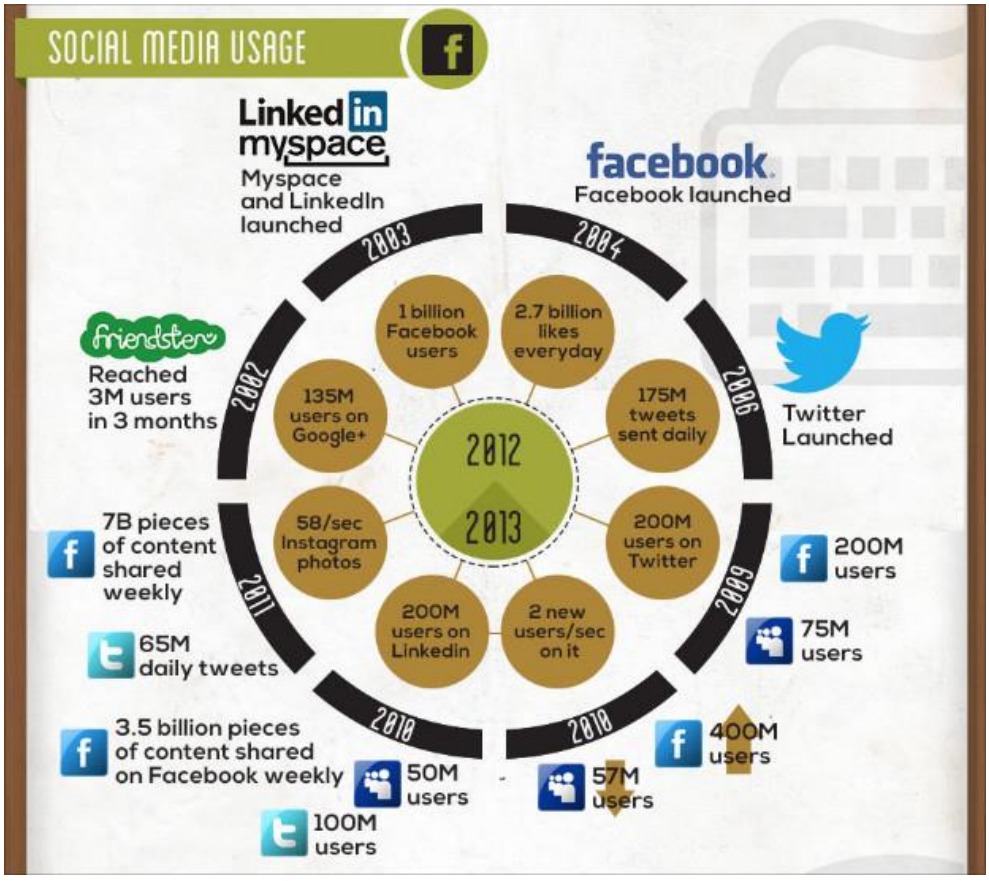

40. [4pts] Your grand uncle comes over for Thanksgiving and at the dinner table he mentions that machines are going to take over the world very soon. To make his argument he cites the following
    a. Sophia, a social humanoid robot, has the ability to make more than 50 facial expressions and she can also talk and converse with humans.
    b. In a movie he recently watched, he noticed that the robots had the ability to read human thoughts and were making human decisions.
    c. The recent closure of a General Motors car manufacturing plant shows that machines are replacing human jobs and very soon we will all be jobless.

Explain, in a respectful manner (he is your uncle), how each of the statements does not mean that machines are taking over. It is important, that your responses be grounded in the concepts explored in our course.

a. _____

_____

_____

_____

_____

b. _____

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c. _____

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Note that any work that you do on this page may be graded. It is important that you clearly label which question you are working on here. You must also clearly state on the question page that your answer is on this page. Failure to do both of these steps may mean that your answer on this page is not graded.

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

Powers of two

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

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