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?

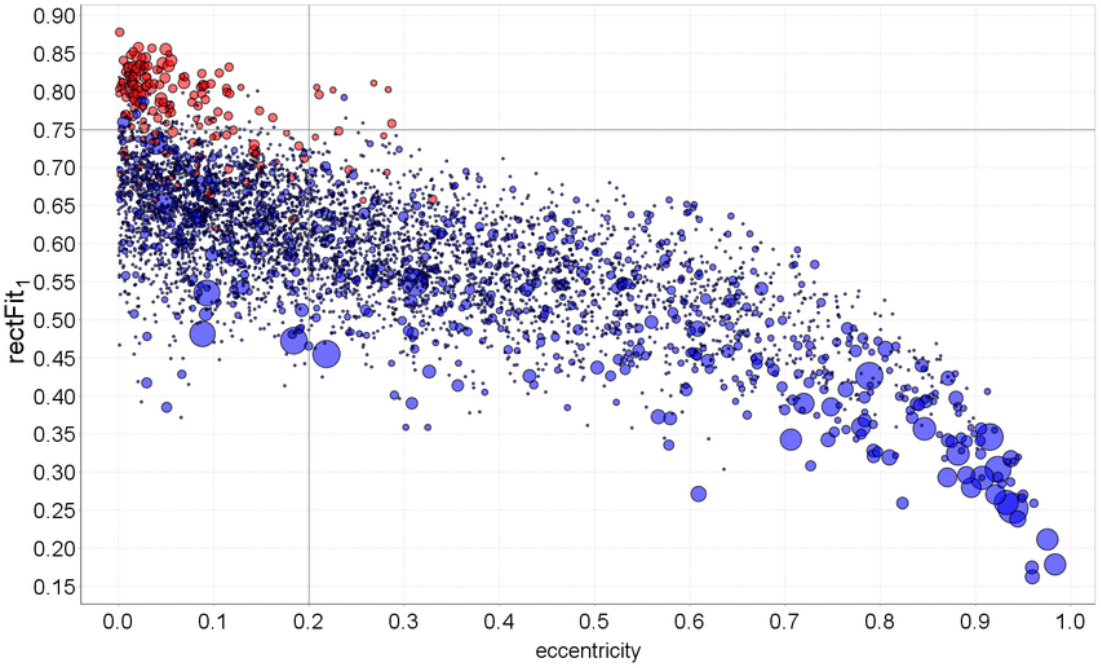
A. They use neural electrons to solve translation problems
B. They solve one tiny function and pass the result on to another neuron
C. They duplicate the functionality of biological neurons exactly
D. All of the above

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

11. _____ requires inferring parts of speech and sentence structure using a lexicon and grammar.

12. _____ is the thought processes involved in formulating problems and their solutions so that the solutions are in a form that can be effectively carried out by an information-processing agent.

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

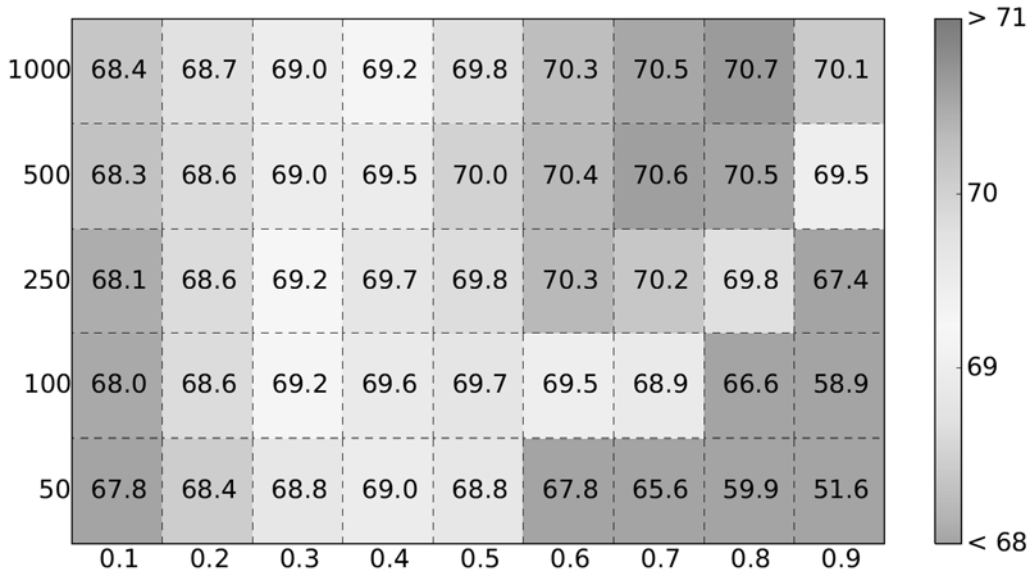
17. Let's say that instead of having a base 10 number system, we had a new type of system where each digit represents 5 symbols, how many digits would I need to represent 56 symbols?

_____

18. Let's say that instead of having a base 2 number system, we have a new type of system where each digit represents 4 symbols, how many symbols can we represent with 5 digits?

_____

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



20. List two accomplishments of Alan Turing

_____

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_____

PART 3: Short Answer Questions

Write the answer in the space provided.

21. [3pts] **List three ways** that we evaluated algorithms over the course of the term. Another way of the phrasing this question is *"besides correctness, what criteria would you use to select one algorithm over another"*?

    _____

    _____

    _____

22. [6pts] **List four theories** as to why there is a lower percentage of women in computer science when compared to other disciplines.

    _____

    _____

    _____

    _____

23. [2pts] What does it mean to say that the k-means clustering algorithm ***stabilizes***?

    _____

    _____

    _____

24. [2pts] What is the *maximum* number of clusters that the k-means algorithm can produce, when the input is a dataset with 50 points and k = 5? Explain your answer briefly.

    _____

    _____

    _____

25. [2pts] What is the *minimum* number of clusters that the k-means algorithm can produce, when the input is a dataset with 100 points and k = 40? Explain your answer briefly.

_____

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26. [3 pts] What is an example of an adversarial attack in the context of machine learning models and why is it important for software developers?

_____

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27. [6 pts] In class, we talked about ***"garbage in garbage out in"*** different modules. Give three examples of why garbage in garbage out is important. Your examples must be distinct and not reference the same idea. For instance, if we were talking about the concept of WYSIWYG, listing the New York Times mistake and the Iraq War/Italian journalist mistake would be concerned the same example.

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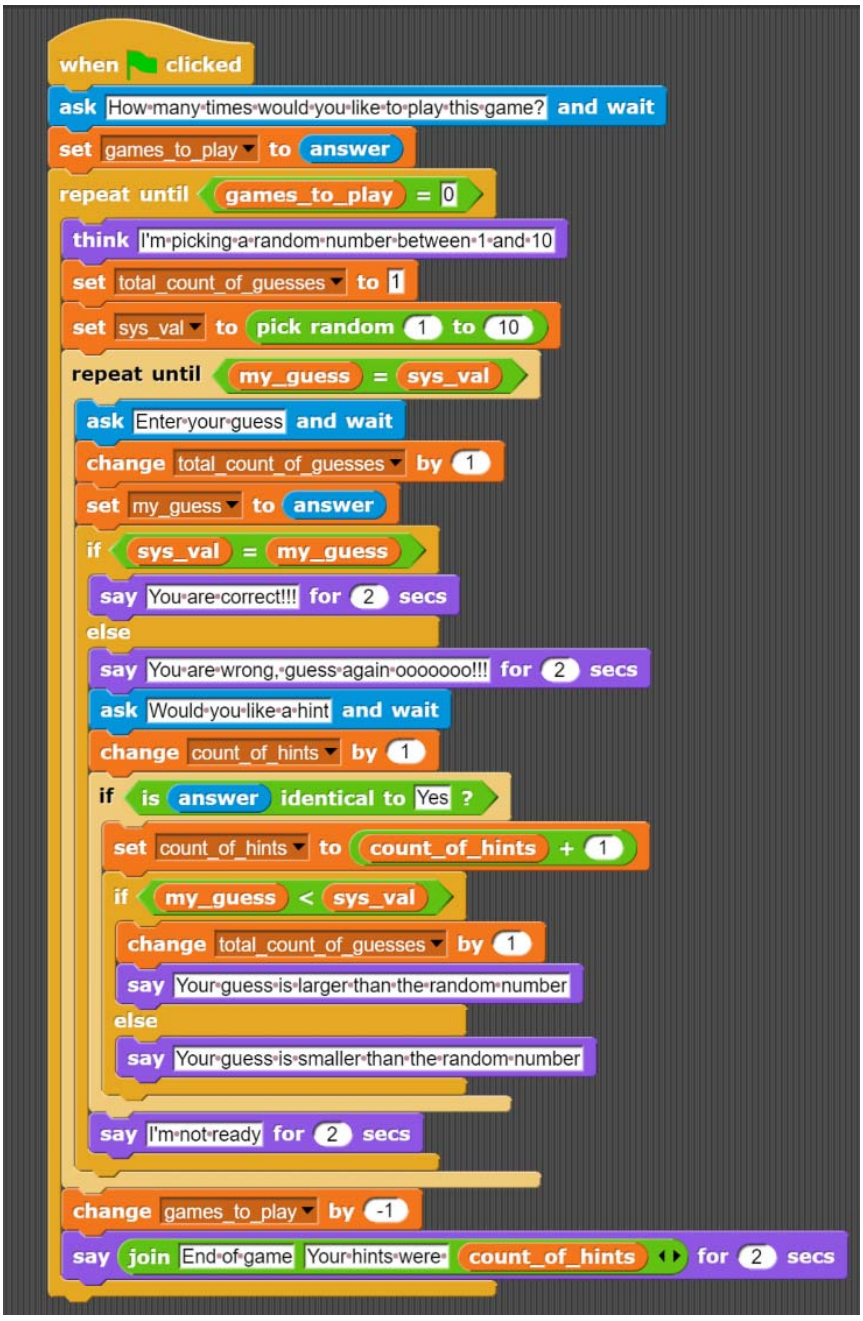
Use the snap program shown to answer Questions 28 – 30



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. [3pts] 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)?

30. [4pts] 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?

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

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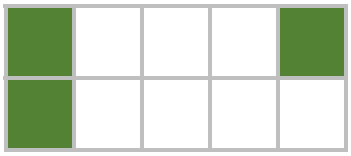
32. [4pts] Use the bitmap image for the next two questions. For all colours, where applicable, please write the representation in hex. The darker color is green, while the lighter one is white.

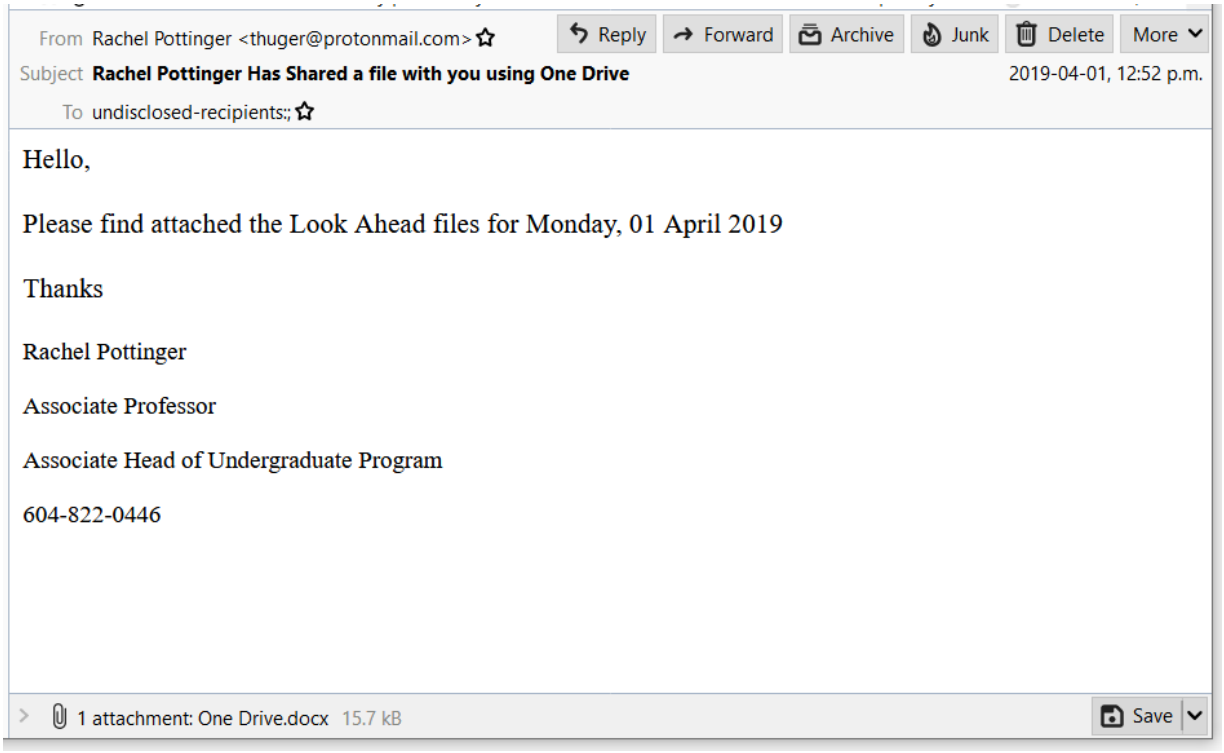


Write out the non-compressed representation	Write the lossless compression representation

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

_____

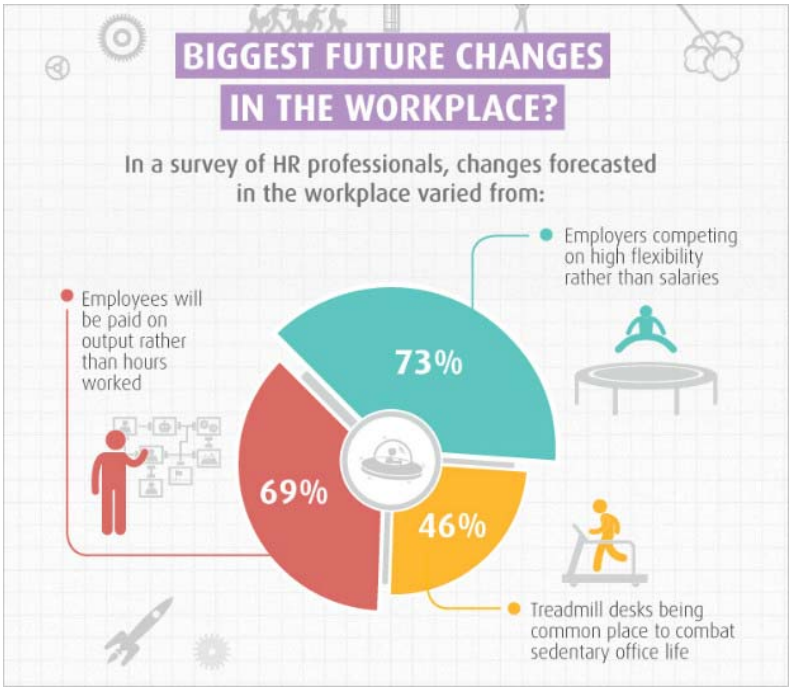
What is **one problem** with the infographic below?

_____

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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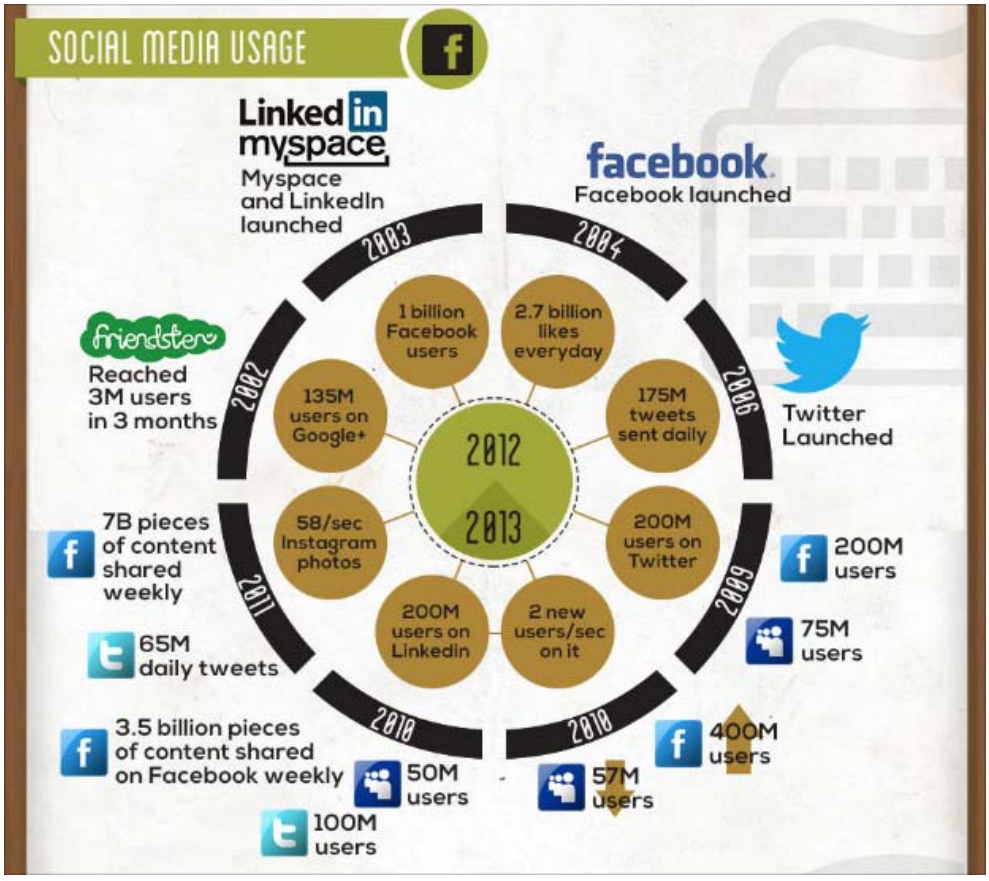

40. [4pts] Your grand uncle comes over for Thanksgiving and at the dinner table he mentions that machines are going to take over the world very soon. To make his argument he cites the following
    a. Sophia, a social humanoid robot, has the ability to make more than 50 facial expressions and she can 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. _____

_____

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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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