CS2019 ASSIGNMENT 4 (Due Date: Oct 11, 2019)

Name: _____

Student ID: _____

Instructions: This paper consists of three parts. Pasrt I has seven multiple-Choice questions. Part II has five questions. Questions in Part I and Part II are compulsory questions. You need to answer all of them. Part III consists of two questions. They are bonus questions. You can skip them if you do not have time to do so.

PART I: MC Questions (Compulsory)

Question 1 - Question 7 are logical questions. You need to select one of the following options for your answer.

(a) The first argument is true. The second one is false.

(b) The first argument is false. The second one is true.

(c) Both arguments are true but the first argument is not the cause of the second argument.

(d) Both arguments are true and the first argument is the cause of the second argument.

Question 1

There was no computer in 400 years ago. So, there was no information system in 400 years ago.

Question 2

Charles Babbage invented the first mechanical computer. So, UK made the first commercial computer in the middle of 20 century.

Question 3

US made the first commercial computer in the history. So, the first computer-based information system was made in US.

Question 4

A cell phone can connect to the Internet via WiFi. Therefore, your cell phone cannot connect to the Internet if the WiFi option in your cell phone is set to off.

Question 5

Safari is a browser developed for MacOS. Therefore, it is not possible to install Safari in a computer running Window OS but no other migration assistant.

Question 6

Google Play is a platform for selling Android Apps. Therefore, the customers of Google Play are the buyers who purchase the Apps.

Question 7

BIOS is a RAM. Therefore, the first instruction to be executed by the CPU is stored in BIOS.

PART II (Compulsory)

Question 8

(a) In the early 20 century, there was electricity supply. But there was no commercial computer and no Internet available. Thus, there was no information system for managing information and there was no email for communication. Long distance telephone call was very expensive. Imagine that you were the boss of a shoe manufacturing firm. How could you search for the potential partners and distributors in US to sell your shoes?

(b) Today, we have computers, Internet and hence information systems. Moreover, there are plenty of AI technologies being developed. Again, imagine that you were the boss of a shoe manufacturing firm. How could you search for the potential partners and distributors in US to sell your shoes by using the latest technologies (inlcuding information and communication technologies, as well as AI technologies)?

Question 9

Using NAND gates only, to implement the following logic gates or circuit.

(a) AND gate.

(b) OR gate.

(c) XOR gate.

(d) Half adder.

To answer this question, you can simply draw the diagrams on a piece of paper. Then, you can take a photo of the paper and paste it on your document. *File size limit: The photo should not be larger than 1MByte.* It should be as small as possible.

Question 10

As introduced in the lecture, a text file is basically a file of a stream of characters in form of binary bits. Each character is encoded by 8 bits. Now, you keyed in the command "type temp01.txt" on the command prompt and see the following content.

```
C:\>type temp01.txt
J 1.
M 2.
C:\>
```

For another file "temp02.txt", you do the same thing and you see the following content.

```
C:\>type temp02.txt
J 1. M 2.
C:\>
```

(a) In file 'temp01.txt', what is the number of bytes being used for storing the content and what is the binary stream of it?

(b) In file 'temp02.txt', what is the number of bytes being used for storing the content and what is the binary stream of it?

Question 11

To store an image, it could be saved in different format, like JPEG, BMP and PS format.

(a) State the full names of the above formats.

(b) Which format can maintain the highest resolution of an image?

(c) Describe why there are many format for storing an image?

Question 12

(a) What is the advantage of using 2's-Compliment to encode a negative integer?

(b) For a 16 bit long number, what is the bit pattern of a number '-107'?

PART III (Optional)

Question 13

You are given a set of 9 balls. All of them look the same. It is known that one of them has different weight. Let say, eight of them weight 2000 grams and one of them weights either 1999 grams or 2001 grams. Human is unable to sense this little difference. We do not know whether the abnormal ball is lighter or heavier than normal. Now, the only instrument you have is a pan balance. Your job is to find out which one is abnormal.

(a) By drawing a diagram showing how you can use this pan balance to find out the abnormal ball.

(b) Count, for the worst case, how many times the pan balance has been used so that the problem is solved.

Question 14

Similar to Question 13. You are given a set of 9 balls. But now, there are two abnormal balls inside. You have no information regarding the abnormal balls. So, it could be one lighter and one heavier. It could be both lighter (resp. heavier).

(a) By drawing a diagram showing how you can use this pan balance to find out the abnormal ball.

(b) Count, for the worst case, how many times the pan balance has been used so that the problem is solved.