**CS2021 FALL Assignment 4**

**Due Date: October 8, 2021**

**Ethical issues**

1. What should you do if you have come across someone who is logging in an account?
2. What should you do if you have come across someone who is reading emails (resp. letters)?
3. You are now in a computer room in the *computer center*. You would like to access a computer to edit a WORD document for the Assignment 4. You have found that only one computer is not in use. All the others are occupied with students. Let say the one not in use is called Computer X. You find that Computer X has no response to any input, no matter from the mouse clicks and the keyboard typing. Now, what will you do? Shut down and then restart the computer?
4. In the lecture, John Sum has introduced a method to set a secure password. With an aid of example, describe how to set a secure password by using the method.

**Problem Solving**

1. You are given a set of 9 balls which are looked and sensed the same. In this set of balls, six of them are normal balls and three of them are abnormal. For the normal balls, each of them weights 2000 grams. For the abnormal balls, they could be 1999 grams or 2001 grams. We do not know how many abnormal balls weight 1999 grams and how many abnormal balls weight 2001 grams. That is to say, it is possible that all abnormal balls are 1999 grams or all abnormal balls are 2001 grams. It is also possible that two abnormal balls are 2001 grams and one abnormal ball is 1999 grams. Describe in detail, the step by step, how do you use the pan balance to find out all the abnormal balls.
2. Imagine that you are now standing in front of two doors, say X and Y. One of them leads you to heaven and the other leads you to hell. In each door, there is a doorman. Let the doorman standing in front of the door X is A and the doorman standing in front of the door Y is B. For the doormen, it is known that one of them always lies and the other always tells the truth. Besides, the doormen only answer ‘Yes’ or ‘No’ to you. For instance, if you ask to a doorman “the current president of Taiwan is a lady”, the liar doorman will answer ‘No’ and the truth teller doorman will answer ‘Yes’. (a) Now, if you can ask two questions, what questions you will ask and which doorman you will ask so that you can find out which door is going to heaven? (b) If you can only ask one question, what question you will ask and which doorman you will ask so that you can find out which door is going to heaven?

**Digital Systems**

1. What are the values of $2^{-2},2^{-1},2^{0},2^{1},2^{2},2^{8}, 2^{10},2^{20},2^{30},2^{40}$?
2. How many bits refer to one byte?
3. How many bytes is 1Mbytes?
4. How many bytes is 1Gbytes?
5. How many bytes is 1Tbytes?
6. For a character to be encoded in ASCII format, how many bytes are needed?
7. To encode the four-character string ‘John’ in ASCII format, what exactly the binary string is it?
8. To encode the three-character string ‘C S’ in ASCII format, what exactly the binary string is it?