MAD101--Assignment 03

PART 01: **-----Applications of Trees-----**

Exercise 01/. Consider the following sentence:

"**nguoi yeu cu da co tinh nhan moi**"

a) Draw a binary search tree for this sentence;
b) How many comparisons are needed to search for the word "**tinh**" in the binary search tree.

Exercise 02/. We consider the following message:

"**I LOVE YOUUU**"

a) Construct a Huffman coding to encode the message;
b) Compute the length of the bit string when encoding this message by a Huffman coding;
c) What is the average number of bits used for each letter?

PART 02: **-----Tree Traversal-----**

Exercise 03/. Suppose we're looking at an arithmetic expression like this:

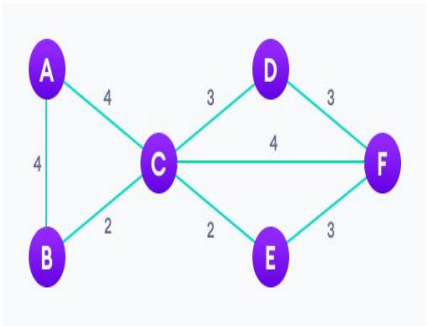
$$(y^3 + x)^7 + 4x$$

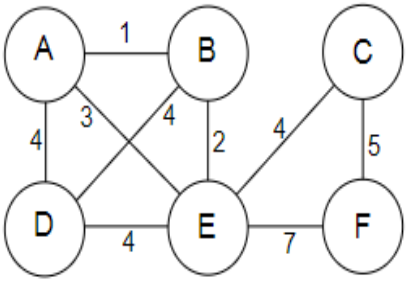
a) Use a binary tree to represent this expression;
b) Write this expression in prefix notation, infix notation and postfix notation.

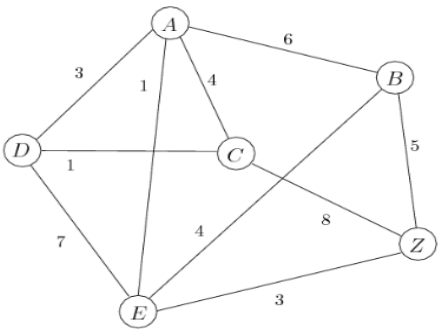
Exercise 04/. bài tập 23.d và 24.c trong textbook tại trang 723.

PART 03: **-----Spanning Trees-----**

Exercise 05/. Given weighted graphs:







G1 **G2** **G3**

What is the total weight of the minimum spanning tree produced by the graph G1/G2/G3?

Exercise 06/. Bài tập 17 (trang 618) và bài 20 (trang 619) trong textbook.

Exercise 07/. Let **G** be an undirected graph of five vertices A, B, C, D, E with the incidence matrix

$$\begin{bmatrix} 1 & 1 & 1 & 0 & 0 & 0 & 0 & 0 \\ 0 & 1 & 1 & 1 & 0 & 1 & 1 & 0 \\ 0 & 0 & 0 & 1 & 1 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 1 & 1 \\ 0 & 0 & 0 & 0 & 1 & 1 & 0 & 0 \end{bmatrix}.$$

a) Is the graph G a simple graph?
b) $\deg(D) = ?$
c) Is the graph G a complete graph?
d) How many connected components are there?
e) How many cut vertices are there?
f) How many cut edges are there?
g) Determine the adjacency matrix of the graph G.
h) Count the number of paths of length 3 between A and C in the graph G.
i) Determine whether the graph G has an Euler circuit/Euler path/Hamilton circuit/Hamilton path?

GOOD LUCK !