**Algorithm and Graph Review**

1. Draw balanced heap trees for following lists of numbers
   1. 1 4 8 6 20 15 4 9 21 35 67 5 7
   2. 12 5 7 9 20 11 56 3 21 19
2. Draw balanced binary search trees for following lists of numbers
   1. 1 4 8 6 20 15 4 9 21 35 67 5 7
   2. 12 5 7 9 20 11 56 3 21 19
3. Write the function MergeSort(**A**, *n*) where **A** is an array of *n* real numbers.
4. Write a function to output all permutations of *n* elements:.

Example: *n* = 3

123, 132, 213, 231, 312, 321

1. Write a function to output all binary numbers of length *n* and the number of ‘1’ digits is smaller or equal to the number of ‘0’ digits.

Example: *n* = 3

000,001,010,100

1. Given a sequence of *n* integer numbers A(1) ... A(*n*), your task is to find the longest subsequence (not necessarily contiguous) in which the values in the subsequence form a strictly increasing sequence.

Example: 8 3 5 10 15 6 7 12 9 11 17 13 16

Output: 3 5 6 7 9 11 13 16

1. Given an undirected computer network with *n* nodes (numbered from 1 to *n*) and *m* edges, your task is to write a program to calculate the number of connected components that each contains at least three nodes.
2. Given *n* jobs (numbered from 1 to *n*) and *m* order requirements. Each order requirement is a pair of two jobs *u* and *v* indicating that job *u* must be done before job *v*. Your task is to write a program to order these jobs to fulfill the order requirements.
3. Given *n* cities (numbered from 1 to *n*) and *m* roads connecting cities. The traffic level between two cities *u, v* is D[*u,v*]. You have two tasks:
   1. Write a program to find a path from a starting point *s* to the end point *e* such that the total traffic level on the path is the smallest.
   2. Write a program to find the smallest traffic paths for all pairs of
4. Write a regular expression that matches these numbers:

* (123) 456 7899
* (123).456.7899
* (123)-456-7899
* 123-456-7899
* 123 456 7899
* 1234567899

1. Write a regular expression that validate strings of which:
   1. can consist of numbers, lowercase and uppercase characters.
   2. can consist of separators: hyphens, underscores, spaces.
   3. do not have two consecutive separators.
   4. do not have separators at the start or the end.