Ambo University @ Woliso Campus

School of Technology and Informatics

Department of Computer Science

Analysis of Algorithm Assignment

for

4th year Computer Science

Extension Program Students.

NOTE:

- Submission of the assignment before DEADLINE is possible.
- But after deadline assignment will be received with **deduction of mark.**
- Submission Date should be **June 25, 2020.**
- Copying from others makes your mark zero.
- Please do the assignment carefully and completely. You may evaluated by it only for a course.
- *Submit your assignment in .**pdf** format or by capturing photo and scanning as a single file if it is hand writing.*
- *Unclear, deleted, unreadable and insensible* answer makes your work **valueless**.
- *You can ask me any question, suggestion, unclear or doubt ideas about a course and assignment via one of bellow addresses.*
- Submit your assignment for me through my:
  - ***e-mail:*** **yoobsanb3@gmail.com**
  - ***telegram:*** **Yoobsan B Begi** ***or*** **0934407791**

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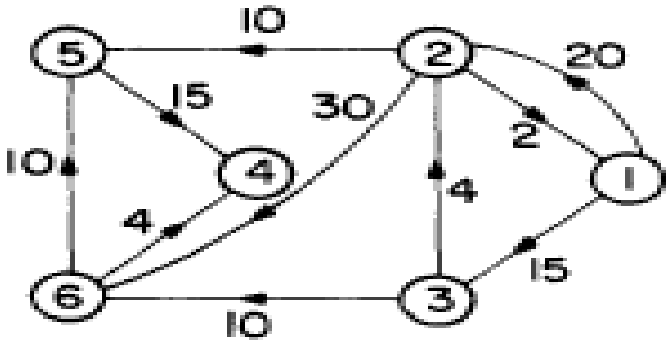
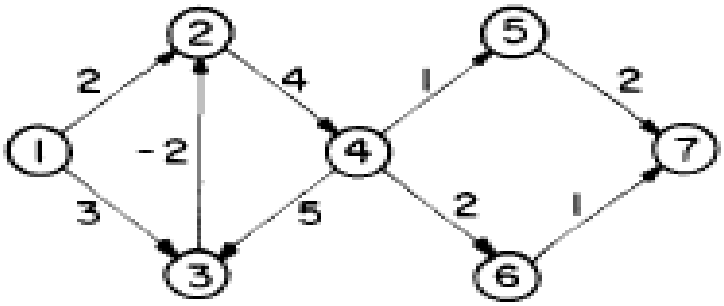
May/26/2020, AU, Oromia, Ethiopia

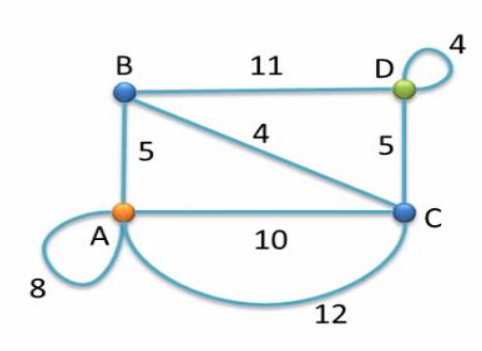
1) The worst case time of procedure MERGESORT is O (n log n). What is its time in the best case? Can we say that the time for merge sort is theta (n log n)?
2) A sorting method is said to be stable if at the end of the method identical elements occur in the same order as in the original unsorted set. Is merge sort a stable sorting method?
3) Find an optimal solution to the knapsack instance $n = 7$, $M = 15$, (Pt, *p2, ...* ,p7) = (10, 5, 15, 7, 6, 18, 3) and (wt, w2, ... , w7) = (2, 3, 5, 7,1, 4, 1)?
4) [Coin changing] Let *An* = {at , *a* 2, ... , *an}* be a finite set of distinct coin types (e.g., at = 50¢, a_2 = 25¢, a $_3$ = 10¢ etc.) We may assume each *a;* is an integer and that at > *ai* > · · · > *an.* Each type is available in unlimited quantity. The coin changing problem is to make up an exact amount *C* using a minimum total number of coins.
5) Use algorithm SHORTEST-PATHS to obtain in non-decreasing order the lengths of the shortest paths from vertex 5 to all remaining vertices in the digraph.



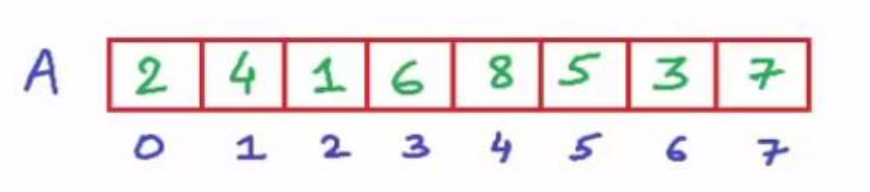
6) Using the directed graph of Figure bellow explains why SHORTEST-PATHS will not work properly. What is the shortest path between vertices v_1 and *v 7?*



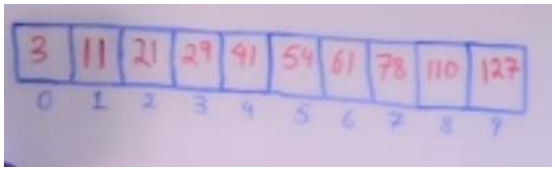
7) We can write an algorithm either by flow chart or pseudo code. Write an algorithm which finds the average of n numbers by both ways.
8) What are algorithms? Why is the study of algorithms worthwhile? What is the role of algorithms relative to other technologies used in computers?
9) Use the bellow graph diagram and find the minimum path from vertex A to D by :
    a) Kruskal algorithm
    b) Dijkstra's algorithm and
    c) Compare them, which algorithm is efficient?



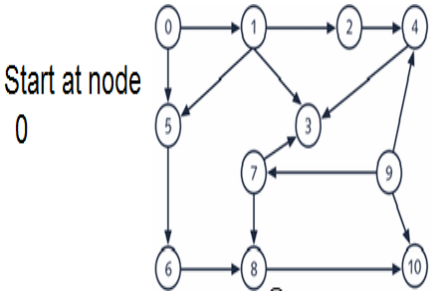
10) Use the bellow array A and sort it by using:
    a) Merging sort
    b) Bubble sort
    c) Insertion sort and
    d) Compare which is efficient?



11) Use the bellow array and search the number **54** by using :
    a) Binary search
    b) Linear search and
    c) Compare which algorithm is best?



12) Find the order of traversing the following graphs using:
    a) DFS and
    b) BFS



GOOD LUCK!