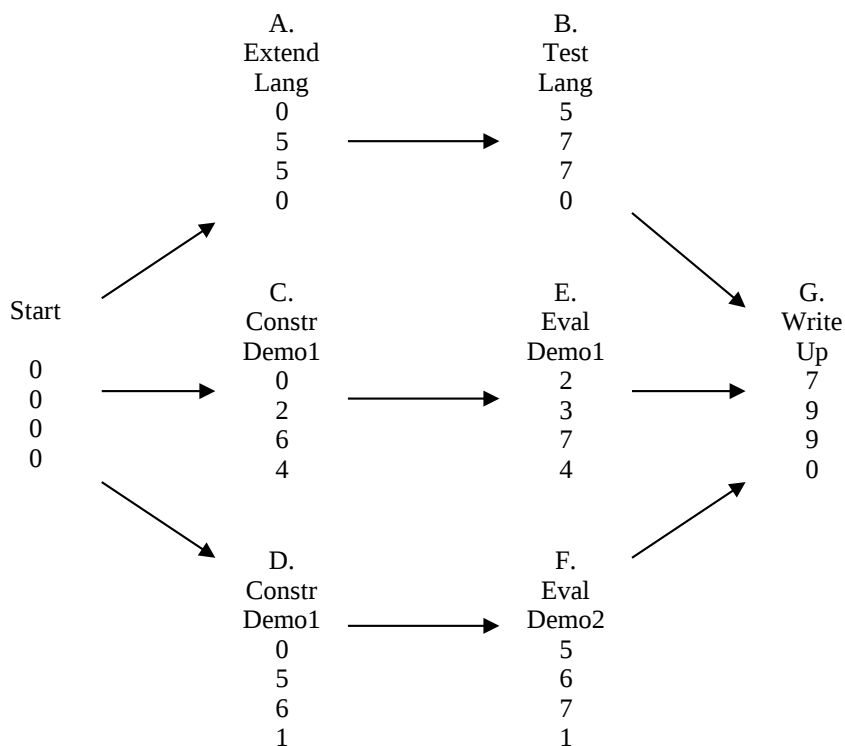


Topological Order & Task Networks

1. a)

i) Construct a PERT graph for the project, showing earliest start time, earliest finish time and latest finish time and slack for each event.



ii)

b) From your network, identify the following properties of the project:

i) The project finish time, i.e. minimum duration.

9 weeks

ii) The critical path(s).

START,A,B,G

c) From your graph, identify the following orders.

i) Two topological orders of the vertices.

There are many possible orders that obey the dependency relationship, and two are given below. Important properties are that

- **START comes before all other vertices, i.e. all other vertices depend on START**

- **A comes before B, C comes before E, D comes before F**

- **B, E and F all come before G**

START,A,B,C,D,E,F,G

START,C,D,E,F,A,B,G

ii) Two lists of vertices that are not topological orders.

There are many possible orders that disobey the dependency relationship: i.e. contradict the properties outlined above, e.g.

A,B,START,C,D,E,F,G

START,C,D,E,F,G,A,B,

d) Starting in each case with the original PERT graph for the project give project finish time, critical path(s), and a brief explanation if the durations of the following activities change.

i) Activity A takes 6 weeks

Duration: 10 weeks

Critical path: START,A,B,G

Explanation: Activity A on the critical path

ii) Activity C takes 3 weeks.

Duration: 9 weeks

Critical path: START,A,B,G

Explanation: Activity C not on the critical path, and increased time doesn't place it on critical path

iii) Activity D takes 6 weeks.

Duration: 9 weeks

Critical paths: START,A,B,G, START, D,F,G

Explanation: Activity D now on critical path, but doesn't increase overall duration.

e) By week 5 the project is on schedule with activities A, C, D and E completed.

i) Management requests that the project is completed 1 week early. Identify activities whose duration could be reduced, and for each activity recommend by how much the duration should be reduced

B –1 week

G – 1 week

Or both B and G ½ week each.

ii) Management enquires whether the project could be completed 2 weeks early. Indicate if this is possible, and if so identify activities whose duration could be reduced, and for each activity recommend by how much the duration should be reduced

Possible. Both B and G 1 week each.