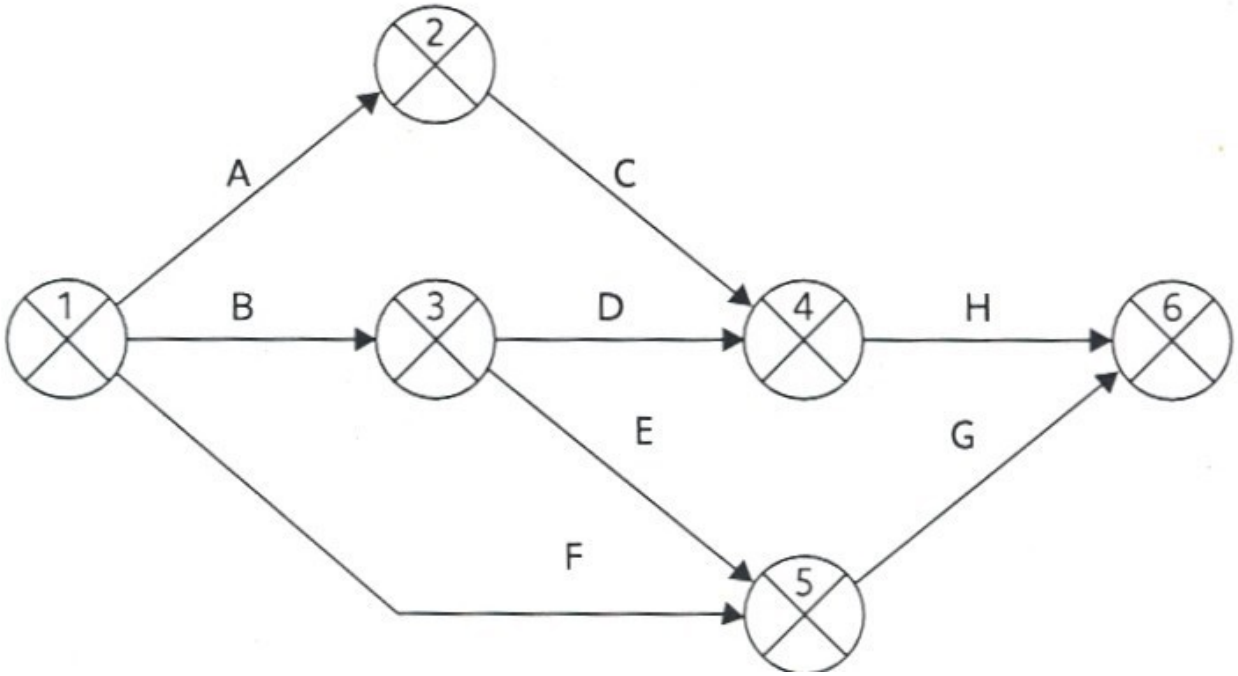
Activity-On-Arrow Network

- Links or arrows represent **activities**.
- Nodes represents **events**.



Activity-On-Arrow (cont'd)

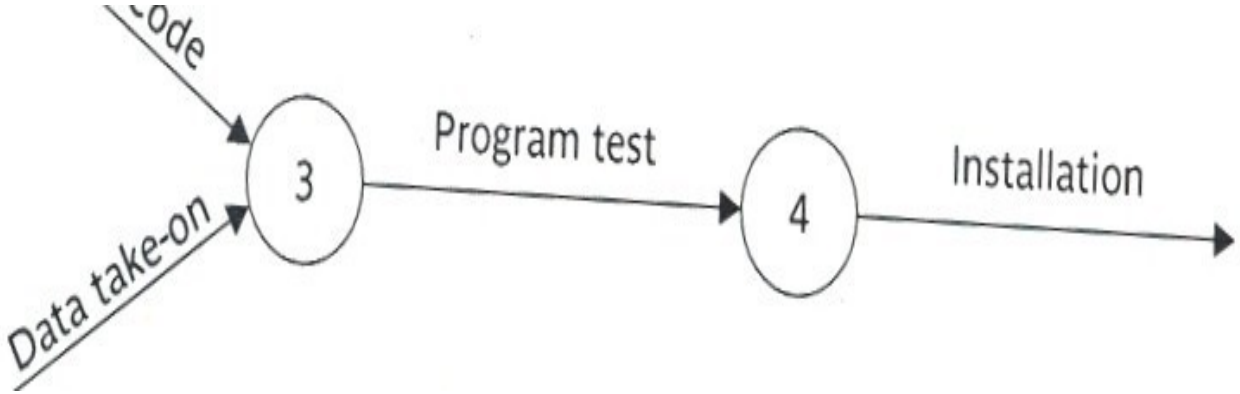
Rules and Conventions

- A project network may have one start node.
- A project network may have only one end node.
- A link has duration.
- Nodes have no duration.
  - Nodes are events.
    - The source node.
    - The sink node.
    - The intermediate nodes.

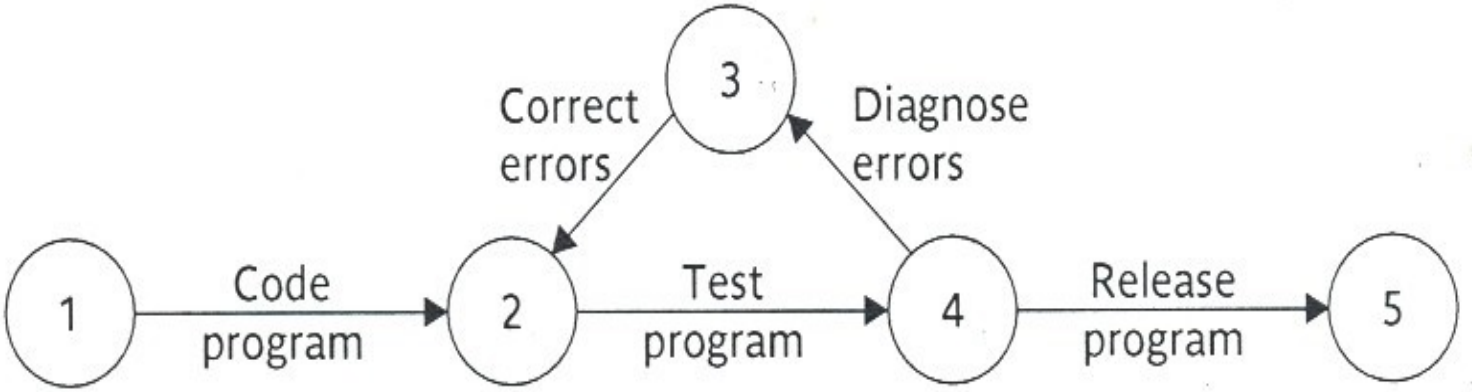
Activity-On-Arrow (cont'd)

- Time moves from left to right.
- Nodes are numbered sequentially.
- A network may not contain Loops.
- A network may not contain dangles.

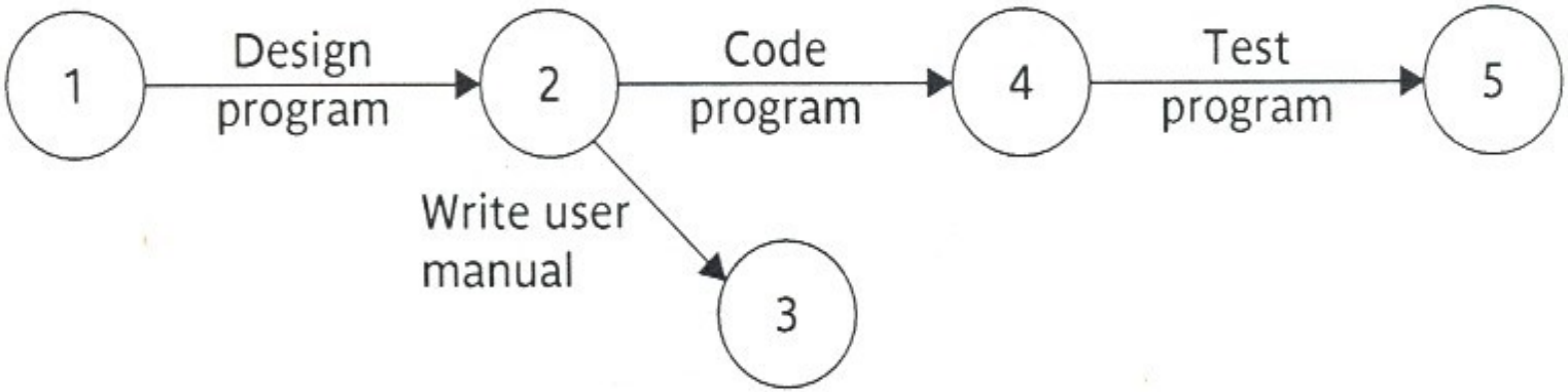
Sequential numbering



A loop



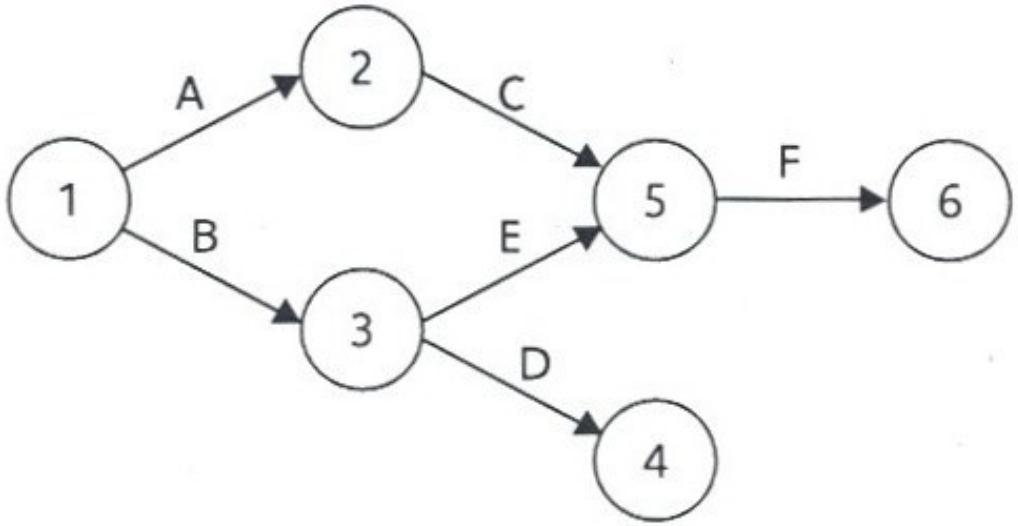
A Dangle


1
Design program
2
Code program
4
Test program
5
Write user manual
3

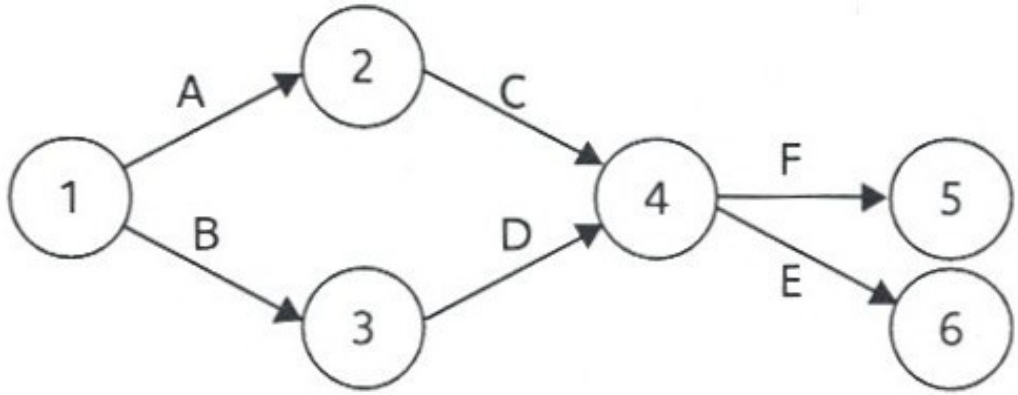
Exercise

what is wrong with the following?

(a)

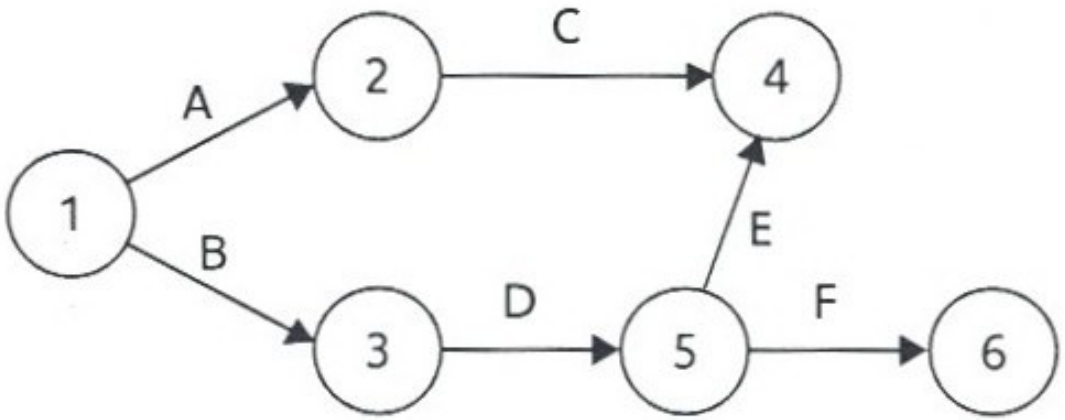


(b)

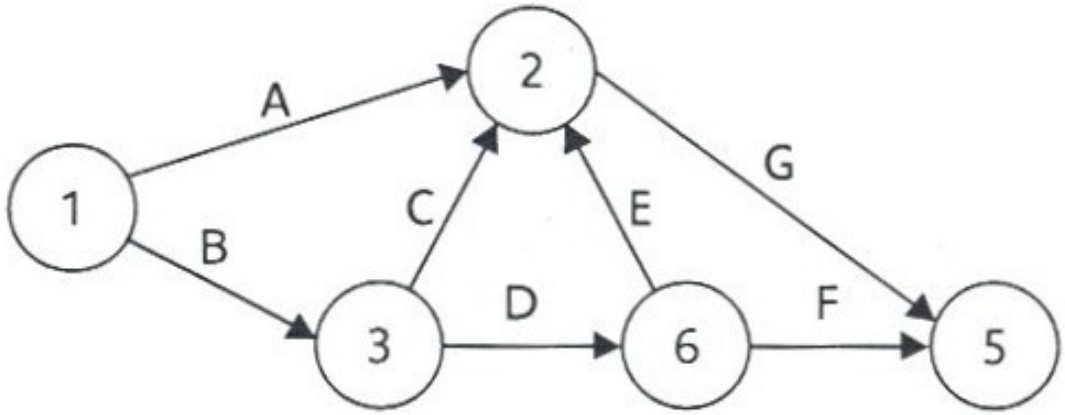


Exercise
what is wrong with the following

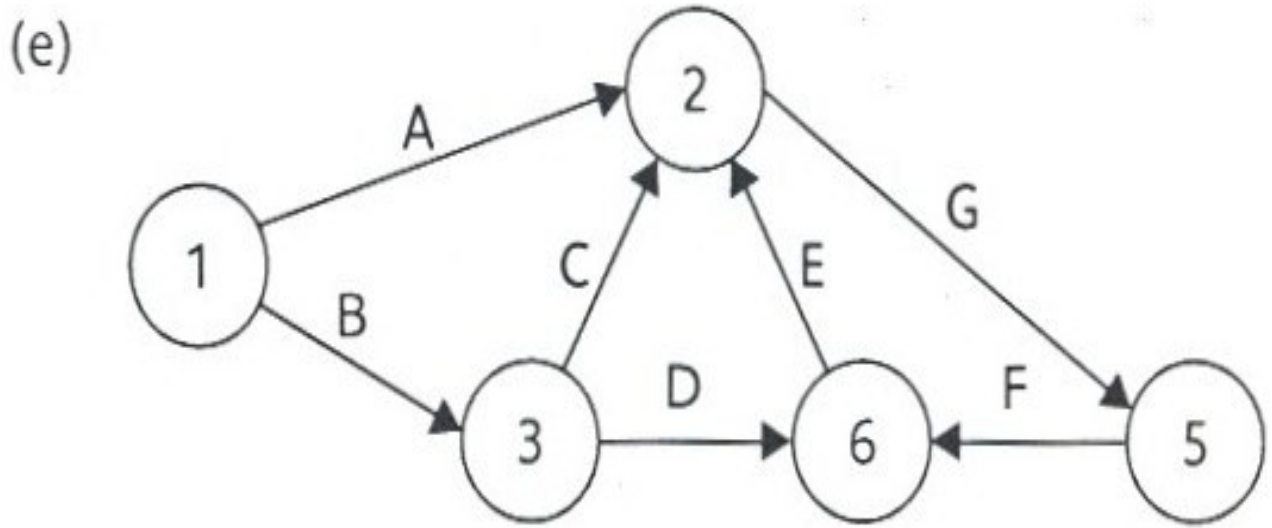
(c)



(d)



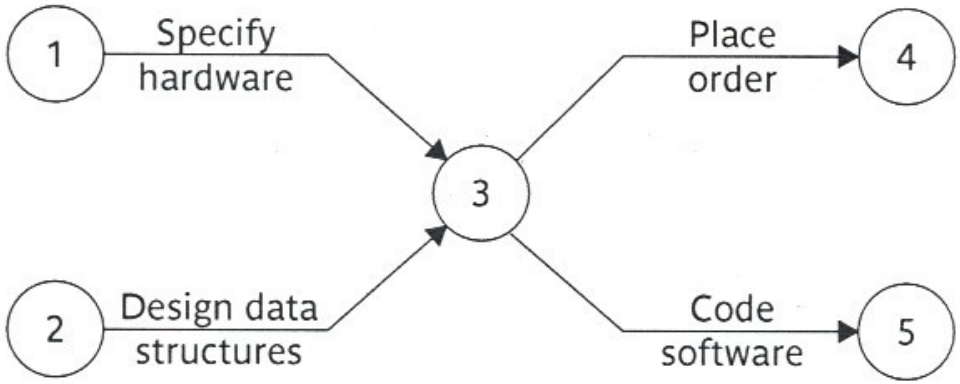
Exercise
what is wrong with the following



Dummy Activities

Suppose that in a project,

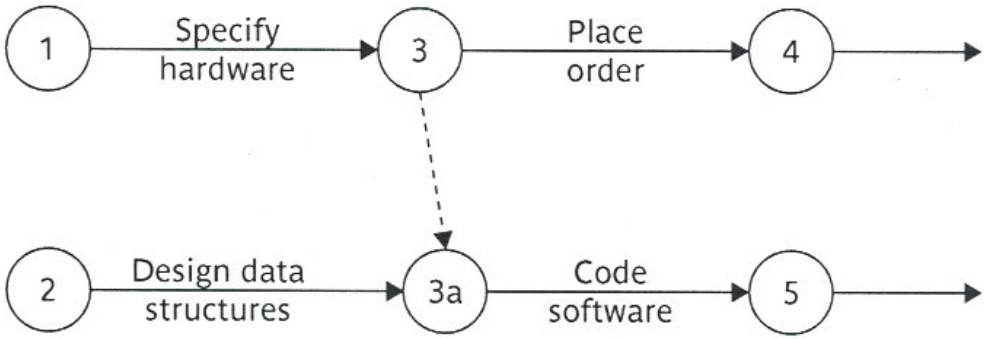
- **Before you can start "coding the software" you need to:**
  - "Specify the hardware".
  - "Design data structures".
- **Before placing an order you only need to:**
  - "Specify the hardware".



A logical error

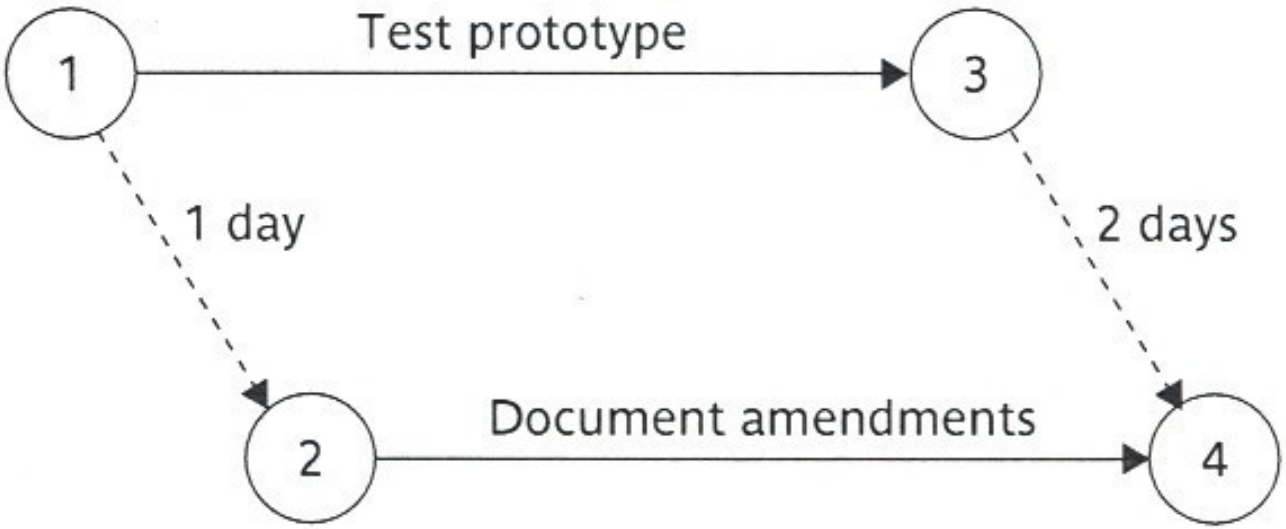
Dummy Activities

- **Resolving the error using a dummy activity.**
- **Dummy activities:**
  - **Are used to aid in the layout of network drawings.**



Lagged Activities

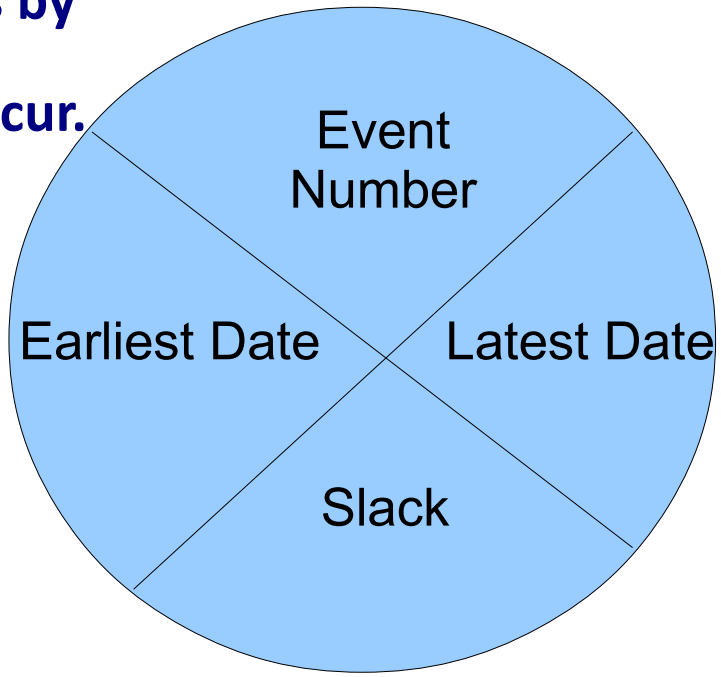
We represent lagged activities with a pair of dummy activities.



Activity Labeling

Divide the node circle into quadrants:

- **Event number**
- **Earliest and latest dates by which the event will occur.**
- **slack**



Network Analysis

The Forward Pass: it is carried out to calculate:

- the earliest date on which each event may be achieved and
- the earliest dates on which each activity may be started and completed.
- The earliest date for an event is the earliest date by which all activities upon which it depends can be completed.

Network Analysis (cont'd)

- **The Backward Pass:** The second stage is to carry out a backward pass to calculate:
  - the latest date at which each event may be achieved, and
  - each activity started and finished , without delaying the end date of the project.
- **The latest date for an event** is the latest date by which all immediately following activities must be started for the project to be completed on time.
- **The Slack** is the difference between the latest date and the earliest date for an event.

Network Analysis (cont'd)

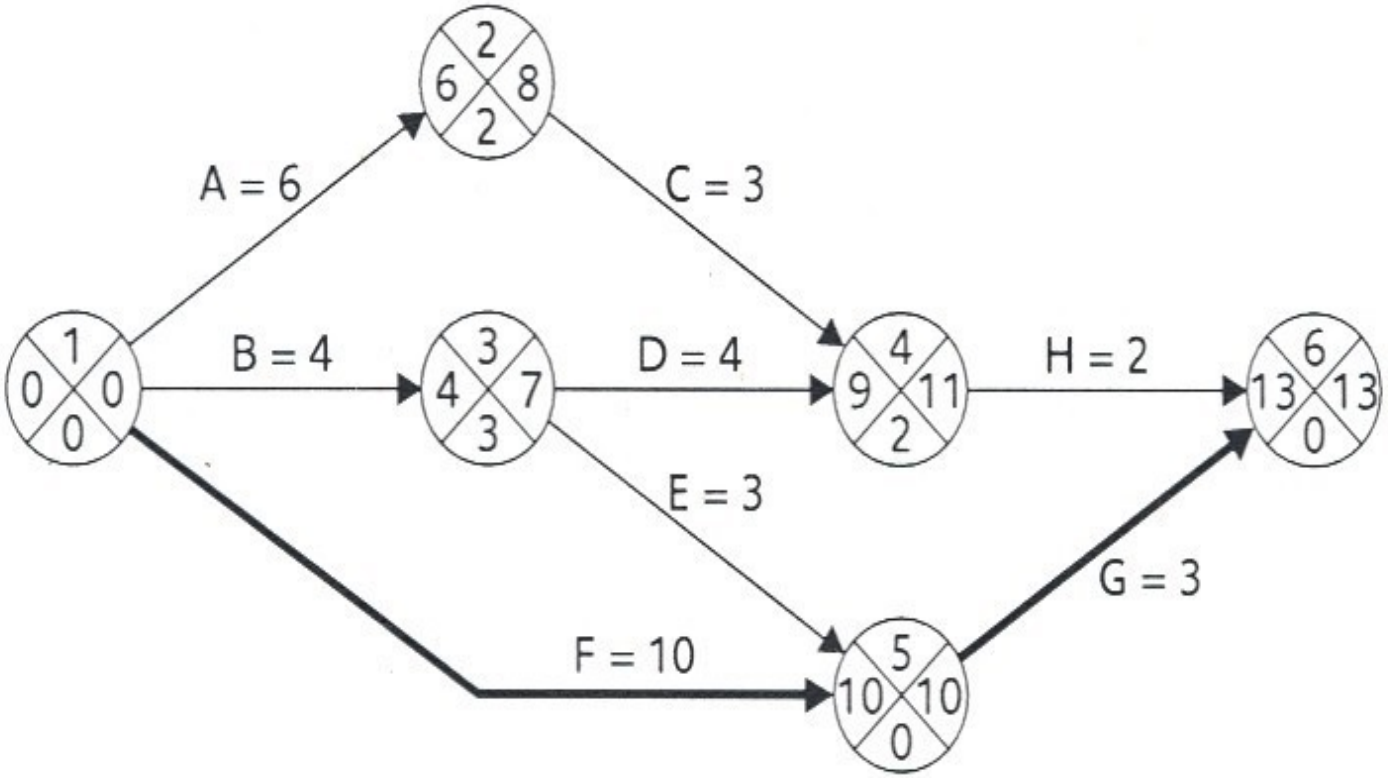
The critical path in the activity-on-arrow network is:

- The path joining all nodes with a "zero" slack.
- The longest path through the network.

Example

Activity		Duration (weeks)	Precedents
A	Hardware selection	6	
B	System configuration	4	
C	Install hardware	3	A
D	Data migration	4	B
E	Draft office procedures	3	B
F	Recruit staff	10	
G	User training	3	E, F
H	Install and test system	2	C, D

Activity-on-Arrow Network.
CPM Network



The project duration is: 13 weeks.