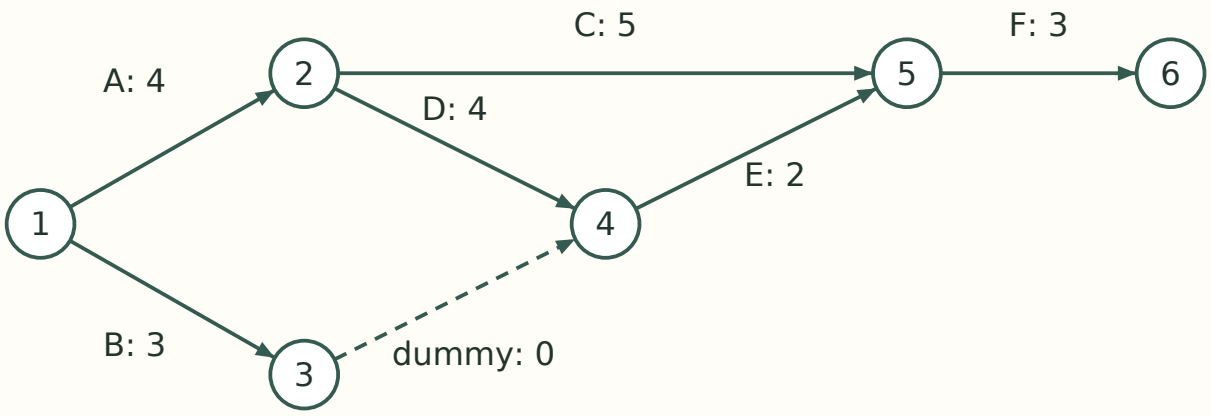
Forward and backward scans

6 questions | 16 marks

Equivalent correct methods earn the corresponding marks.

1. Perform a complete forward scan on the displayed network. [4 marks]



Activity-on-arrow network; durations are in days.

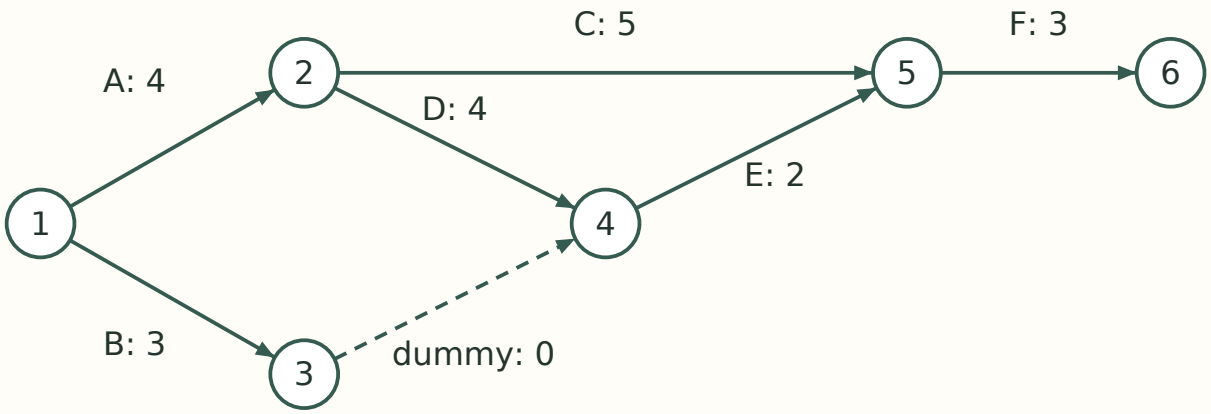
$E_1 = 0$; $E_2 = 4$; $E_3 = 3$.

$E_4 = \max(4+4, 3+0) = 8$.

$E_5 = \max(4+5, 8+2) = 10$; $E_6 = 10+3 = 13$.

Answer: Events 1-6: 0, 4, 3, 8, 10, 13.

2. Perform the backward scan for the displayed network using project finish 13. [4 marks]



Activity-on-arrow network; durations are in days.

$L_6 = 13$; $L_5 = 10$; $L_4 = 8$; $L_3 = 8$.

$L_2 = \min(10 - 5, 8 - 4) = 4$.

$L_1 = \min(4 - 4, 8 - 3) = 0$.

Answer: Events 1-6 latest: 0, 4, 8, 8, 10, 13.

3. Find the earliest time at a merge when incoming tail times and durations are $(2, 7)$, $(6, 2)$ and $(4, 6)$. [2 marks]

Candidates are 9, 8 and 10.

Their maximum is 10.

Answer: 10.

4. Find a latest event time when outgoing head times and durations are $(15, 4)$, $(19, 6)$ and $(14, 2)$. [2 marks]

Candidates are 11, 13 and 12.

Their minimum is 11.

Answer: 11.

5. A forward scan gives an event earliest time 9. A claimed backward scan gives latest time 7 for a finish target equal to the earliest project finish. What does this indicate? [2 marks]

The event cannot both require at least 9 and be required by 7.

Recheck durations, directions and the final-time assumption.

Answer: The scans or the model contain an error.

6. Why does adding all incoming durations at a merge usually give the wrong earliest time? [2 marks]

Each candidate already measures elapsed time from the common start.

The event waits for the latest arrival, not the sum of arrivals.

Answer: It assumes parallel branches occurred one after another.