9. Hamilton County Parks is planning to develop a new park and recreational area on a recently purchased 100-acre tract. Project development activities include clearing playground and picnic areas, constructing roads, constructing a shelter house, purchasing picnic equipment, and so on. The following network and activity times (in weeks) are being used in the planning, scheduling, and controlling of this project.
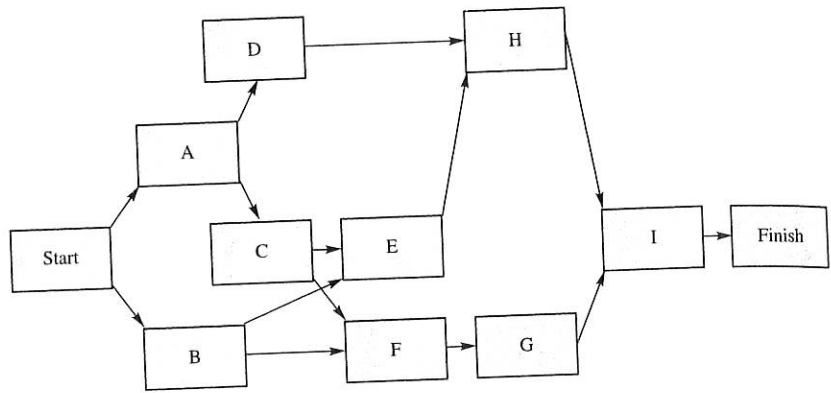
Activity	A	B	C	D	E	F	G	H	I
Time	9	6	6	3	0	3	2	6	3

a. What is the critical path for this network?
b. Show the activity schedule for this project.
c. The park commissioner would like to open the park to the public within six months from the time the work on the project is started. Does this opening date appear to be feasible? Explain.

10. The following estimates of activity times (in days) are available for a small project.

Activity	Optimistic	Most Probable	Pessimistic
A	4	5.0	6
B	8	9.0	10
C	7	7.5	11
D	7	9.0	10
E	6	7.0	9
F	5	6.0	7

a. Compute the expected activity completion times and the variance for each activity.
b. An analyst determined that the critical path consists of activities B-D-F. Compute the expected project completion time and the variance.

11. Building a backyard swimming pool consists of nine major activities. The activities and their immediate predecessors are shown. Develop the project network.

Activity	A	B	C	D	E	F	G	H	I
Immediate Predecessor	—	—	A, B	A, B	B	C	D	D, F	E, G, H

12. Assume that the activity time estimates (in days) for the swimming pool construction project in Problem 11 are as follows:

Activity	Optimistic	Most Probable	Pessimistic
A	3	5	6
B	2	4	6
C	5	6	7
D	7	9	10
E	2	4	6
F	1	2	3
G	5	8	10
H	6	8	10
I	3	4	5

a. What are the critical activities?
b. What is the expected time to complete the project?
c. What is the probability that the project can be completed in 25 or fewer days?

SELF test

13. Suppose that the following estimates of activity times (in weeks) were provided for the network shown in Problem 6.

Activity	Optimistic	Most Probable	Pessimistic
A	4.0	5.0	6.0
B	2.5	3.0	3.5
C	6.0	7.0	8.0
D	5.0	5.5	9.0
E	5.0	7.0	9.0
F	2.0	3.0	4.0
G	8.0	10.0	12.0
H	6.0	7.0	14.0

What is the probability that the project will be completed
a. Within 21 weeks?
b. Within 22 weeks?
c. Within 25 weeks?

14. Consider the following project network.
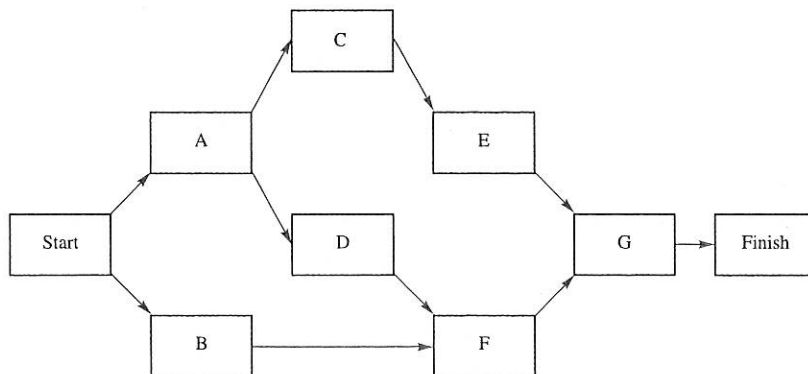
Estimates of the optimistic, most probable, and pessimistic times (in days) for the activities are

Activity	Optimistic	Most Probable	Pessimistic
A	5	6	7
B	5	12	13
C	6	8	10
D	4	10	10
E	5	6	13
F	7	7	10
G	4	7	10

    a. Find the critical path.
    b. How much slack time, if any, is in activity C?
    c. Determine the expected project completion time and the variance.
    d. Find the probability that the project will be completed in 30 or fewer days.

15. Doug Casey is in charge of planning and coordinating next spring's sales management training program for his company. Doug listed the following activity information for this project.

Activity	Description	Immediate Predecessor	Time (weeks) Optimistic	Most Probable	Pessimistic
A	Plan topic	—	1.5	2.0	2.5
B	Obtain speakers	A	2.0	2.5	6.0
C	List meeting locations	—	1.0	2.0	3.0
D	Select location	C	1.5	2.0	2.5
E	Finalize speaker travel plans	B, D	0.5	1.0	1.5
F	Make final check with speakers	E	1.0	2.0	3.0
G	Prepare and mail brochure	B, D	3.0	3.5	7.0
H	Take reservations	G	3.0	4.0	5.0
I	Handle last-minute details	F, H	1.5	2.0	2.5

    a. Draw a project network.
    b. Prepare an activity schedule.
    c. What are the critical activities and what is the expected project completion time?
    d. If Doug wants a 0.99 probability of completing the project on time, how far ahead of the scheduled meeting date should he begin working on the project?

16. The Daugherty Porta-Vac project discussed in Section 10.2 has an expected project completion time of 17 weeks. The probability that the project could be completed in 20 weeks or less is 0.9656. The noncritical paths in the Porta-Vac project network are

$$A-D-G-J$$
$$A-C-F-J$$
$$B-H-I-J$$

    a. Use the information in Table 10.5 to compute the expected time and variance for each path shown.