

Motivated by Stevenson, W. J. (1989). Introduction to management science. IRWIN, Boston. The other problems could be found for example in Hillier, F. S., Lieberman, G. J. (2005). Introduction to operations research.

Problems – CPM/PERT

Problem 1 Let us suppose the project with following activities. As a project manager, which activities would you be concerned with in term of timely project completion?

<i>Activity</i>	<i>Predecessors</i>	<i>Estimated time (days)</i>
A	–	15
B	A	12
C	B	6
D	B	5
E	C	3
F	–	8
G	F	8
H	F	9
I	G	7
J	G, H	14
K	J	6

Problem 2 Determine the slack time for each activity in the previous problem.

Problem 3 A project manager need to run project which consists on activities listed in the following table.

<i>Activity</i>	<i>Predecessors</i>	<i>Optimistic time (days)</i>	<i>Most likely time</i>	<i>Pessimistic time</i>
A	–	5	6	7
B	–	8	8	11
C	A	6	8	11
D	–	9	12	15
E	C	5	6	9
F	D	5	6	7
G	F	2	3	7
H	B	4	4	5
I	D, E, H	5	7	8

- Use most likely times and apply CPM. What is the shortest possible duration of the project? Which activities are critical? Identify the slack for each activity.
- Apply PERT method and decide what is expected duration of the project.
- What is the probability that the will completed in 24 days or less? In 21 days or less?
- The manager needs to know in what time the project will be completed with probability at least 95 percent.

Problem 4 *The project manager had hoped to be able to complete a construction of a domed stadium to the start of the next college football season. After reviewing construction time estimates, it now appears that the certain amount of crashing will be needed to ensure that the project is completed before the season opener. Given the time and cost estimates bellow, determine a minimum-cost crashing schedule that will save five weeks off the project length.*

<i>Activity</i>	<i>Pred.</i>	<i>Norm. time (weeks)</i>	<i>Crash time</i>	<i>Norm. cost (\$ 000)</i>	<i>Crash cost</i>
<i>A</i>	–	12	10	100	140
<i>B</i>	<i>A</i>	14	12	80	100
<i>C</i>	–	10	12	20	30
<i>D</i>	<i>C</i>	17	15	60	100
<i>E</i>	<i>C</i>	18	15	40	85
<i>F</i>	<i>C</i>	12	10	30	60
<i>G</i>	<i>D</i>	15	13	50	100
<i>H</i>	<i>E</i>	8	–	50	–
<i>I</i>	<i>F</i>	7	6	40	70
<i>J</i>	<i>I</i>	12	10	100	150
<i>K</i>	<i>B</i>	9	5	80	120
<i>M</i>	<i>G</i>	3	–	10	–
<i>N</i>	<i>H</i>	11	10	60	100
<i>P</i>	<i>H, J</i>	8	6	40	80