Chapter 3 Homework

Concept Question 1.1

The three phases involved in the management of large projects are

- A. scheduling, operating, and evaluating.
- B. scheduling, designing, and operating.
- C. planning, scheduling, and evaluating.
- D. planning, scheduling, and controlling.

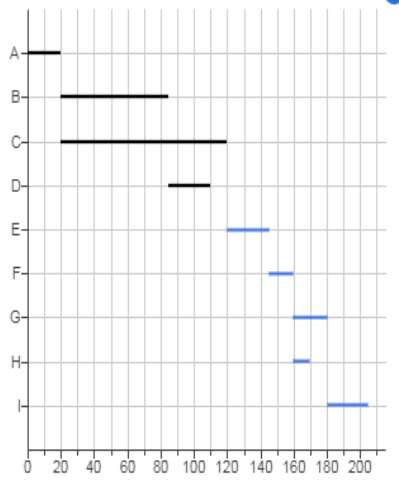
Problem 3.3

The City Commission of Nashville has decided to build a botanical garden and picnic area in the heart of the city for the recreation of its citizens. The precedence table for all the activities required to construct this area successfully is as follows:

Code	Description	Time (hrs)	Immediate Predecessor(s)
A	Find location; determine resource requirements	20	None
B	Requisition of lumber and sand	65	A
C	Dig and grade	100	A
D	Saw lumber into appropriate sizes	25	B
E	Position lumber in correct locations	25	D, C
F	Nail lumber together	15	E
G	Put sand in and under the equipment	20	F
H	Put dirt around the equipment	10	F
I	Put grass all over the garden, landscape, paint	25	G, H

Refer to the legend for the activity that corresponds to each code.

Using the line drawing tool, draw a Gantt chart for activities E through I of the project.



Concept Question 3.1

Gantt charts are

- A. planning charts used to schedule resources and allocate time.
- B. widely used network techniques.
- C. not easy to understand.
- D. not widely used.

Problem 3.5b

In the following table the activities with their precedence sequence and expected time (days) are listed for a project on which Carl Betterton's construction company is working:

Activity	Immediate Predecessor(s)	Time (days)
A	-	7
B	A	4
C	A	6
D	B	6
E	B	4
F	C	4
G	D	6
H	E, F	7

Carl's team should be able to complete the project in 24 days.

Critical path activities for Carl's project are A - C - F - H .

A + C + F + H ➔ 7 + 6 + 4 + 7 = **24 Days**

Problem 3.8a

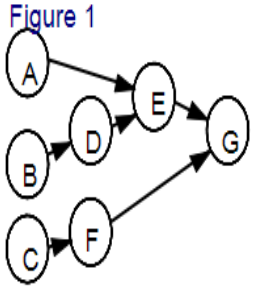
Roger Ginde is developing a program in supply chain management certification for managers. Ginde has listed a number of activities that must be completed before a training program of this nature could be conducted. The activities, immediate predecessors, and times appear in the accompanying table:

Activity	Immediate Predecessor(s)	Time (days)
A	–	4
B	–	6
C	–	1
D	B	10
E	A, D	5
F	C	5
G	E, F	12

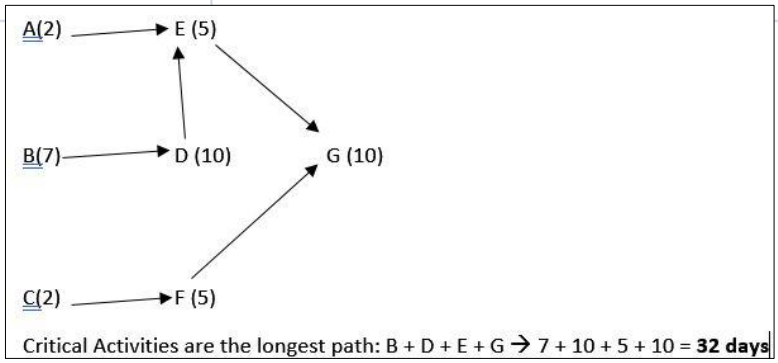
This exercise contains only part a.

a) The correct precedence diagram for the project is shown in Figure 1 .

Figure 1



Problem 3.8b



Critical Activities are the longest path: B + D + E + G → 7 + 10 + 5 + 10 = **32 days**

Activity	Immediate Predecessor(s)	Time (days)
A	–	2
B	–	7
C	–	2
D	B	10
E	A, D	5
F	C	5
G	E, F	10

This exercise contains only parts b, c, and d.

b) The critical activities for the leadership training program development project are B - D - E - G .

c) The project length for the leadership training program development project = 32 days. Critical path activities have no slack time

d) Slack time for each of the activities is: **ES = Max {EF of all immediate predecessors}** **EF = ES + Activity time**

LF = Min {LS of all immediate following activities} **LS = LF – Activity time**

Slack = LS – ES or Slack = LF – EF

- Critical path activities have no slack time

Activity	Slack Time
A	15
B	0
C	15
D	0
E	0
F	15
G	0

Early Start = Max {EF of all immediate predecessors}		Early Finish = ES + Activity Time
A	0	0 + 2 =2
B	0	0 +7 =7
C	0	0 + 2 =2
D	7	7 + 10 =17
E	B-D=>7 + 10 =17	17 + 5 =22
F	2	2 + 5 =7
G	EF of 22 is the Max of predecessors	22 + 10 =32

Late Finish = Min{LS of all immediate following activities}	
G	Critical activities B-D-E-G==>7 +10 + 5 + 10 =32
F	LS of G is 22, so LF of F =22
E	LS of G is 22, so LF of F =22
D	Min of LS for E or G=> Min of (17,22) =17
C	Min of LS for F or G=> Min of (17,22)=17
B	Min of LS for D, E or G=> Min of (7,17,22)=7
A	Min of LS for E or G=> Min of (17,22) =17

Late Start = LF - Activity Time	
G	32 - 10 =22
F	22 - 5 =17
E	22 - 5 =17
D	17 - 10 =7
C	17 - 2=15
B	7 - 7=0
A	17 - 2=15

Slack = LS - ES	
A	15 - 0 =15
B	0 - 0 =0
C	15 - 0 =15
D	7 - 7 =0
E	17 - 17=0
F	17 - 2 =15
G	22 - 22 =0

Problem 3.9a

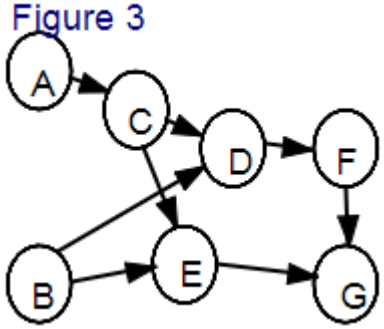
Task time estimates for the modification of an assembly line at Jim Goodale's Carbondale, Illinois, factory are as follows:

Activity	Time (in hours)	Immediate Predecessor(s)
A	6.0	—
B	7.2	—
C	6.0	A
D	8.0	B, C
E	4.8	B, C
F	7.7	D
G	6.0	E, F

This exercise contains only part a.

a) The correct precedence diagram for the project is shown in Figure 3 .

Figure 3



Problem 3.9b

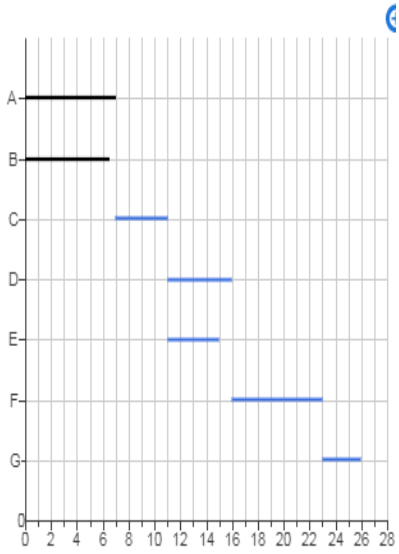
Task time estimates for the modification of an assembly line at Jim Goodale's Carbondale, Illinois, factory are as follows:

Activity	Time (in hours)	Immediate Predecessor(s)
A	7.0	-
B	6.5	-
C	4.0	A
D	5.0	B, C
E	4.0	B, C
F	7.0	D
G	3.0	E, F

This exercise contains only parts d, b, and c.

d) Using the line drawing tool five times, draw a Gantt chart for activities C through G of the project based on the early times.

Carefully follow the instructions above, and only draw the required objects.



b) The critical path activities for the leadership training program development project are A - C - D - F - G .

c) The project length for the leadership training program development project = 26 hours *(round your response to one decimal place).*

A + C + D + F + G ➔ 7.0 + 4.0 + 5.0 + 7.0 + 3.0 = **26 hours**

Problem 3.10a

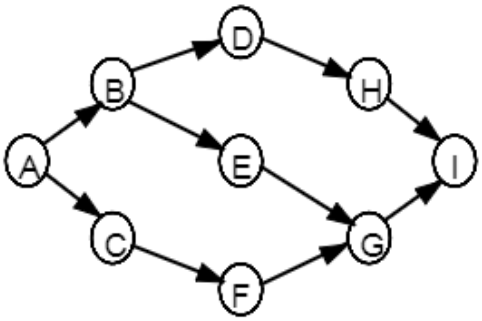
The activities described by the following table are given for the Howard Corporation in Kansas:

Activity	Time	Immediate Predecessor(s)
A	9	–
B	7	A
C	3	A
D	6	B
E	9	B
F	4	C
G	6	E, F
H	5	D
I	3	G, H

This exercise contains only part a.

a) For the project, the correct precedence diagram is shown in Figure 3 .

Figure 3



Concept Question 5.2

The critical path of a network is the

- A. path with the most activities.
- B. shortest time path through the network.
- C. path with the fewest activities.
- D. longest time path through the network.

Concept Question 2.1

The project organization may be LESS helpful when

- A. the work contains complex interrelated tasks requiring specialized skills.
- B. the project cuts across organizational lines.
- C. the job is familiar to the existing organization.
- D. work tasks can be defined with a specific goal and deadline.

Problem 3.15

Question Help

Dave Fletcher was able to determine the activity times for constructing his laser scanning machine. Fletcher would like to determine ES, EF, LS, LF, and slack for each activity. The total project completion time and the critical path should also be determined. Here are the activity times:

Activity	Time (weeks)	Immediate Predecessor(s)	Activity	Time (weeks)	Immediate Predecessor(s)
A	5	-	E	5	B
B	7	-	F	6	B
C	2	A	G	10	C, E
D	3	A	H	7	D , F

Dave's earliest start (ES) and earliest finish (EF) are:

ES = Max {EF of all immediate predecessors}

	Early Start (ES)
A	0
B	0
C	Predecessor is A, A =5, so C=5
D	Predecessor is A, A =5, so D=5
E	Predecessor is B, B =7, so E=7
F	Predecessor is B, B =7, so F=7
G	Max of all the predecessors EF calculated first--> EF of C=7, EF of E =12, EF of G=12
H	Max of all the predecessors EF calculated first--> EF of D=8, EF of F =13, EF of H =13

Activity	ES	EF
A	0	5
B	0	7
C	5	7
D	5	8
E	7	12
F	7	13
G	12	22
H	13	20

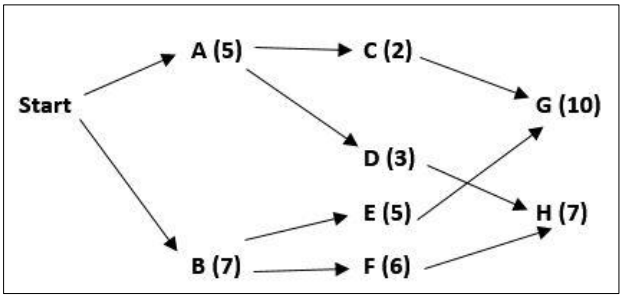
EF = ES + Activity time

	Early Finish= ES + Activity Time
A	5+0=5
B	7+0=7
C	2+5=7
D	3+5=8
E	5+7=12
F	6+7=13
G	10+12=22
H	7+13=20

Dave's latest start (LS) and latest finish (LF) are:

LS = LF – Activity time

LF = Min {LS of all immediate following activities}



	Late Finish
H	B-->E-->H==>7+5+10=22
G	B-->E-->G==>7+5+10=22
F	LS of H=15, so LF of F =15
E	LS of G=12, so LF of G=12
D	LS of H=15, so LF of D =15
C	LS of G=12, so LF of C=12
B	LS of B=7, so LF of B=7
A	LS of C=10, so LF of A=10

Activity	LS	LF
H	15	22
G	12	22
F	9	15
E	7	12
D	12	15
C	10	12
B	0	7
A	5	10

Concept Question 6.1

How is the EF computed?

- A. LF – Activity time
- B. ES + Activity time
- C. Max{EF of all immediate predecessors}
- D. Min{LS of all immediate following activities}

Problem 3.28

The following is a table of activities associated with a project at Rafay Ishfaq's software firm in Chicago, their durations, what activities each must precede and the crash cost to reduce duration per week:

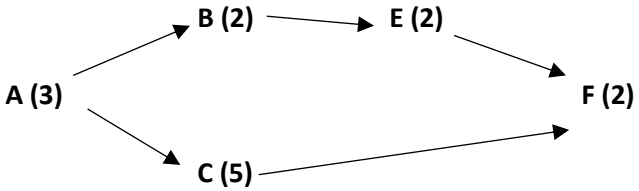
Activity	Duration (weeks)	Precedes	Crash Cost/Week
A (start)	3	B, C	$370
B	2	E	$110
C	5	F	$240
E	2	F	$150
F (end)	2	—	$450

Suppose that Rafay is only given 7 weeks (instead of 10) to complete the project. By how many weeks should each activity be crashed in order to meet the deadline? Assume that you can crash an activity down to 0 weeks duration.

Activity	Each Activity Should be Reduced BY (weeks)
A	0 week(s)
B	2 week(s)
C	3 week(s)
E	0 week(s)
F	0 week(s)

What is the total crashing cost? $ 940 *(Enter your response as a whole number.)*

You would crash B by **2 weeks** because it has the lowest crash per week
You would crash C by **3 weeks** because it has the lowest crash per week



The lowest crashes per week are: B for the critical path; 2 x $110 = $220
C for the other path; 3 x $240 = $720
220 + 720 = **$940**

Problem 3.28

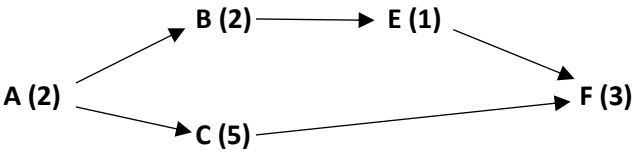
The following is a table of activities associated with a project at Rafay Ishfaq's software firm in Chicago, their durations, what activities each must precede and the crash cost to reduce duration per week:

Activity	Duration (weeks)	Precedes	Crash Cost/Week
A (start)	2	B, C	$370
B	2	E	$120
C	5	F	$200
E	1	F	$160
F (end)	3	—	$420

Suppose that Rafay is only given 7 weeks (instead of 10) to complete the project. By how many weeks should each activity be crashed in order to meet the deadline? Assume that you can crash an activity down to 0 weeks duration

Activity	Each Activity Should be Reduced BY (weeks)
A	0 week(s)
B	1 week(s)
C	3 week(s)
E	0 week(s)
F	0 week(s)

What is the total crashing cost? $ 720 (*Enter your response as a whole number.*)



A – B – E – F ➔ 2 + 2 + 1 + 3 = 8
A – C – F ➔ 2 + 5 + 3 = 10

For A – B – E – F, reduce B by 1 week to get it down to 7 weeks because B is the cheapest.
For A – C – F, reduce C by 3 weeks because it is the cheapest.
(1 x 120) = 120
(3 x 200) = 600
120 + 600 = 720

Concept Question 8.1

What is the shortest duration required to complete an activity?

- A. most likely time
- B. optimistic time
- C. pessimistic time
- D. crash time ✔

Concept Question 9.1

Which of the following is a limitation of PERT and CPM?

- A. They are applicable to only a narrow variety of projects and industries.
- B. They can be used only to monitor schedules.
- C. The graphical nature of a network delays comprehension of the activity list's interrelationships.
- D. There is the inherent danger of placing too much emphasis on the critical path. ✔

Concept Question 9.3

Among the following, critical path and slack time analysis MOST help

- A. highlight relationships among project activities.
- B. pinpoint activities that need to be closely watched. ✔
- C. managers define the project activities.
- D. point out who is responsible for various activities.

Concept Question 10.1

What is the most popular example of specialized software for managing projects?

- A. Microsoft Management Tool
- B. Project Apple
- C. PERT/CPM+
- D. Microsoft Project ✔

Problem 3.28

Questi

The following is a table of activities associated with a project at Rafay Ishfaq's software firm in Chicago, their durations, what activities each must precede and the crash cost to reduce duration per week:

Activity	Duration (weeks)	Precedes	Crash Cost/Week
A (start)	2	B, C	$380
B	2	E	$120
C	4	F	$240
E	1	F	$160
F (end)	3	—	$450

Suppose that Rafay is only given 7 weeks (instead of 9) to complete the project. By how many weeks should each activity be crashed in order to meet the deadline? Assume that you can crash an activity down to 0 weeks duration.

Activity	Each Activity Should be Reduced BY (weeks)
A	0 week(s)
B	1 week(s)
C	2 week(s)
E	0 week(s)
F	0 week(s)

What is the total crashing cost? $ 600 (*Enter your response as a whole number.*)

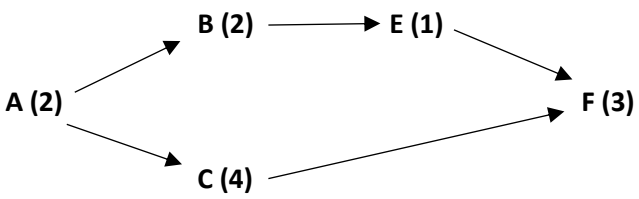
2 + 2 + 1 + 3 = 8 Weeks; 8 – 7=1

B has the lowest crash of $120; 1 x $120 = $120

2 + 4 + 3 = 9 Weeks; 9 – 7=2

C has the lowest crash of $240; 2 x $240 = $480

$120 + $480 = **$600**



Problem 3.29

What is the minimum cost of crashing the following project that Roger Solano manages at Slippery Rock University by 4 days?

Activity	Normal Time (days)	Crash Time (days)	Normal Cost	Total Cost with Crashing	Immediate Predecessor(s)
A	4	3	$800	$1,100	—
B	9	7	$250	$500	—
C	4	3	$600	$650	—
D	9	6	$750	$1,500	A
E	8	6	$1,200	$1,650	C

By how many days should each activity be crashed to reduce the project completion time by 4 days? Fill in the table below. (*Enter your responses as whole numbers.*)

Activity	Each Activity Should be Reduced BY (days)
A	1
B	0
C	1
D	3
E	2

The total cost of crashing the project by 4 days is $ 1550 . (*Enter your response as a whole number.*)

A (4) ⟶ D (9)

B (9)

C (8) ⟶ E (8)

A – D ➔ 4 + 9 = 13
C – E ➔ 8 + 8 = 16
A➔ (1,100 – 800)/ (4 – 3) = 300
B ➔ (500 – 250) / (9 – 7) = 125
C➔ (650 – 600) / (4 – 3) = 50
D ➔ (1,500 – 750)/ (9 – 6) = 250
E ➔ (1,650 – 1,200)/ (8 – 6) = 225
A = 4 – 3 = 1
B = 0 Because it isn't connected to other activities
C= 4 – 3 = 1
D = 9 – 6 = 3
E = 8 – 6 =2

A = 1 x 300 = 300
B = 0
C = 1 x 50 = 50
D = 3 x 250= 750
E = 2 x 225 = 450
300 + 0 + 50 + 750 + 450 = **$1550**

Chapter 3 quiz

Concept Question 5.2

The critical path of a network is the

- A. path with the fewest activities.
- B. shortest time path through the network.
- C. longest time path through the network.
- D. path with the most activities.

Concept Question 1.3

Which of the following is NOT a technique that allows managers to plan, schedule, and control projects?

- A. Gantt charts
- B. PERT
- C. Factor-rating method
- D. CPM

Concept Question 3.2

Which of the following is NOT true about Gantt charts?

- A. Gantt charts also can be used for scheduling repetitive operations.
- B. Gantt charts are planning charts used to schedule resources and allocate time.
- C. Gantt charts are low-cost means of helping managers make sure that activities are planned.
- D. Gantt charts adequately illustrate the interrelationships between the activities and the resources.

Concept Question 5.3

Dummy activities

- A. cannot be on the critical path.
- B. are found in both AOA and AON networks.
- C. are used when two activities have identical starting and ending events.
- D. have a duration equal to the shortest non-dummy activity in the network.

Concept Question 6.2

The latest finish of an activity is

- A. Max{EF of all immediate predecessors}.
- B. ES + Activity time.
- C. Min{LS of all immediate following activities}.
- D. LF – Activity time.

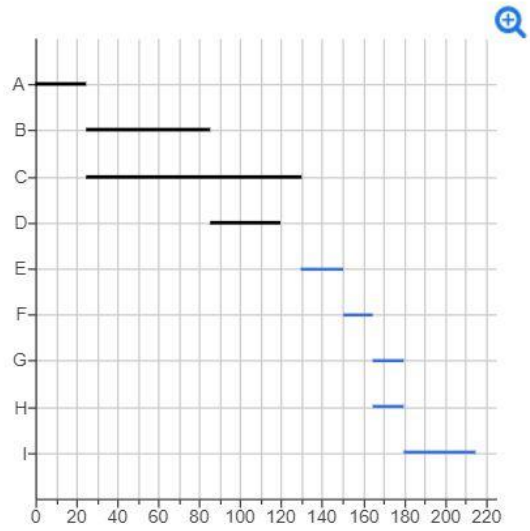
Problem 3.3

The City Commission of Nashville has decided to build a botanical garden and picnic area in the heart of the city for the recreation of its citizens. The precedence table for all the activities required to construct this area successfully is as follows:

Code	Description	Time (hrs)	Immediate Predecessor(s)
A	Find location; determine resource requirements	25	None
B	Requisition of lumber and sand	60	A
C	Dig and grade	105	A
D	Saw lumber into appropriate sizes	35	B
E	Position lumber in correct locations	20	D, C
F	Nail lumber together	15	E
G	Put sand in and under the equipment	15	F
H	Put dirt around the equipment	15	F
I	Put grass all over the garden, landscape, paint	35	G, H

Refer to the legend for the activity that corresponds to each code.

Using the line drawing tool, draw a Gantt chart for activities **E** through **I** of the project.



Problem 3.11b

The following is a table of activities associated with a project at Rafay Ishfaq's software firm in Chicago, their durations and what activities each must precede:

Activity	Duration (weeks)	Precedes
A (start)	1	B, C
B	2	E
C	7	F
E	4	F
F (end)	3	—

This exercise contains only parts b, c, and d.

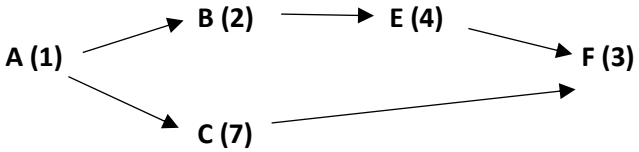
b) The activities on the critical path are A - C - F.

c) The total project completion time for Rafay Ishfaq's software firm is 11 weeks. (*Enter your response as a whole number.*)

d) Determine the slack time for each of the activities. (*Enter your responses as whole numbers.*)

Activity	Slack Time (weeks)
A	0
B	1
C	0
E	1
F	0

What is the total slack for the non critical path(s) in the project? 1 week(s) (*Enter your response as a whole number.*)



Critical Path: A – C – F➔ 1 + 7 + 3 = 11

Activity	ES	EF
A	0	0 +1 =1
B	1	1 + 2 =3
C	1	1 + 7 =8
E	3	3 + 4 =7
F	8	8 + 3 =11

Activity	LS	LF
F	11 - 3=8	11
E	8 - 4 =4	8
C	8 - 7 =1	8
B	4 - 2 =2	4
A	1 - 1=0	1

Slack	LS - ES
A	0 - 0 =0
B	2 - 1 =1
C	1 - 1 =0
E	4 - 3 =1
F	8 - 8 =0

Problem 3.31

Development of Version 2.0 of a particular accounting software product is being considered by Jose Noguera's techr firm in Baton Rouge. The activities necessary for the completion of this project are listed in the following table:

Activity	Normal Time (weeks)	Crash Time (weeks)	Normal Cost	Total Cost with Crashing	Immediate Predecessor(s)
A	4	3	$2,200	$2,850	—
B	2	1	$2,300	$3,100	—
C	3	3	$750	$750	—
D	8	4	$2,500	$2,800	A
E	6	3	$800	$1,175	B
F	3	2	$3,200	$4,600	C
G	4	2	$1,500	$2,000	D, E

a) Based on the given information regarding the activities for the project, the project length = 16 weeks.

b) The total cost required for completing this project on normal time = $ 13,250.

c) For reducing the duration of the project by one week, the activity that should be crashed first is activity D.

The cost of the project based on the first activity selected for crashing will increase by $ 75.

d) The maximum weeks by which the project can be reduced by crashing = 7 weeks.

Total cost of crashing the project to minimum (or maximum weeks possible) = $ 1,575.

$$\text{Crash cost per period} = \frac{\text{(Crash cost – Normal cost)}}{\text{(Normal time – Crash time)}}$$

a)	A - D - G	
	(4 x 2,000) + (8 x 2,500) + (4 x 1,600) = 13,250	
b)	8,000 + 20,000 + 6,400 = 13,250	
	A	2,850 - 2,200 = 650
c)	**D**	**2,800 - 2,500 = 300**
	G	2,000 - 1,500 = 500
	300/4 = 75	
d)	A	4 - 3 =1
	D	8 - 4 =4
	G	4 - 2 =2
	1 + 4 + 2 =7	

A	B
(2,850 - 2,200)/ (4-3)=650	(3,100 - 2,300)/(2 - 1)= 800
D	E
(2,800 - 2,500)/(8-4) = 75	(1,175- 800)/(6 - 3) =125
G	F
(2,000 - 1,500)/(4 - 2)=250	(4,600 - 3,200)/(3-2) = 1,400
975	
A - D -E - G	
(1*650) + (4 x 75) + (1 x 125) + (2 x 250) = 1,575	

Problem 3.6b

In the following table the activities with their precedence sequence and expected time (days) are listed for a project:

Activity	Immediate Predecessor(s)	Time (days)
A	–	5
B	A	2
C	A	4
D	B	5
E	B	5
F	C	5
G	E, F	2
H	D	3
I	G, H	5

a) The activities on the critical path are A - C - F - G - I .

b) The project length is 21 days.

Concept Question 9.2

Which of the following is an advantage of PERT and CPM?

- A. Useful in monitoring only schedules.
- B. Straightforward concept and not mathematically complex.
- C. Precedence relationships must be specified and networked together.
- D. Project activities have to be clearly defined, independent, and stable in their relationships.

Problem 3.10a

The activities described by the following table are given for the Howard Corporation in Kansas:

Activity	Time	Immediate Predecessor(s)
A	9	–
B	7	A
C	3	A
D	6	B
E	9	B
F	4	C
G	6	E, F
H	5	D
I	3	G, H

This exercise contains only part a.

a) For the project, the correct precedence diagram is shown in Figure 3 .

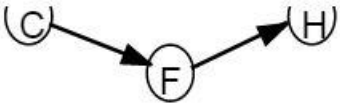
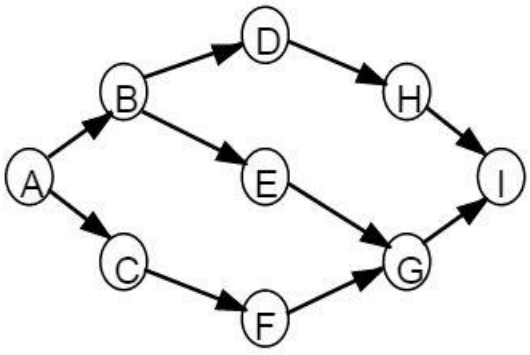


Figure 3



Concept Question 3.4

Which of the following activities are NOT part of project scheduling?

- A. Make sure all necessary activities are finished in proper sequence and on time.
- B. Chart separate schedules for personnel needs by type of skill and materials needs.
- C. Compute resources needed at each stage of production.
- D. Decide how long each activity will take.

Problem 3.6a

In the following table the activities with their precedence sequence and expected time (days) are listed for a project:

Activity	Immediate Predecessor(s)	Time (days)
A	–	7
B	A	2
C	A	4
D	B	5
E	B	5
F	C	5
G	E, F	2
H	D	3
I	G, H	7

The correct AOA precedence diagram is shown in Figure 2 .

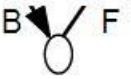
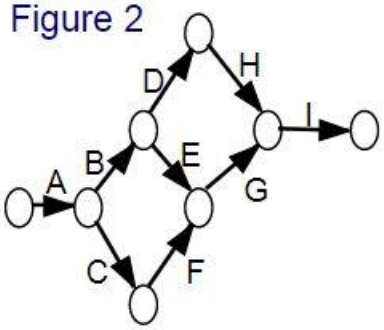


Figure 2



Problem 3.30

Three activities are candidates for crashing on a project network for a large computer installation (all are, of course, critical). Activity details are in the following table:

Activity	Normal Time (days)	Crash Time (days)	Normal Cost	Total Cost with Crashing	Immediate Predecessor(s)
A	7	6	$5,000	$5,500	—
B	4	2	$1,500	$3,400	A
C	11	9	$4,000	$6,200	B

a) Activity that should be crashed first to reduce the project duration by 1 day is A .

b) Activity that should be crashed next to reduce the project duration by one additional day is B .

c) Total cost of crashing the project by 2 days = $ 1,450 . *(Enter your response as an integer.)*

A
(5,500-5,000)/ (7 - 6)= 500
B
(3,400 - 1,500) / (4 - 2) =950
500 + 950 = 1,450

$$\text{Crash cost per period} = \frac{\text{(Crash cost – Normal cost)}}{\text{(Normal time – Crash time)}}$$

Concept Question 2.2

Which of the following is a direct responsibility of the project manager?

- A. calculating completion probabilities for all tasks in the project
- B. performing all of the activities in the project
- C. making sure that the people assigned to the project receive the motivation, direction, and information needed to do their jobs
- D. drawing the network diagram

Problem 3.31

Development of Version 2.0 of a particular accounting software product is being considered by Jose Noguera's technology firm in Baton Rouge. The activities necessary for the completion of this project are listed in the following table:

Activity	Normal Time (weeks)	Crash Time (weeks)	Normal Cost	Total Cost with Crashing	Immediate Predecessor(s)
A	4	3	$2,000	$2,700	—
B	2	1	$2,200	$3,000	—
C	3	3	$600	$600	—
D	8	4	$2,500	$2,820	A
E	6	3	$900	$1,200	B
F	3	2	$3,400	$4,900	C
G	4	2	$1,600	$2,000	D, E

a) Based on the given information regarding the activities for the project, the project length = 16 weeks.

b) The total cost required for completing this project on normal time = $ 13,200.

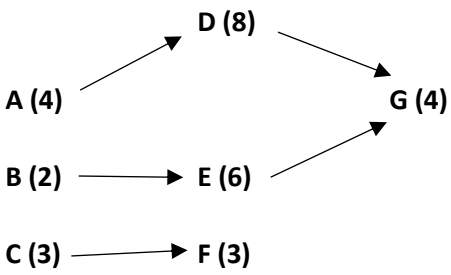
c) For reducing the duration of the project by one week, the activity that should be crashed first is activity D.

$$\text{Crash cost per period} = \frac{\text{(Crash cost – Normal cost)}}{\text{(Normal time – Crash time)}}$$

The cost of the project based on the first activity selected for crashing will increase by $ 80.

d) The maximum weeks by which the project can be reduced by crashing = 7 weeks.

Total cost of crashing the project to minimum (or maximum weeks possible) = $ 1,520.



	A - D - G is the critical path		
a)	4 + 8 + 4 = 16 weeks		
b)	A+B+C+D+E+F+G==> 2,000+2,200+600+2,500+900+3,400+1,600=13,200		
c)	crash cost per period		
	A	(2700-2000)/(4-3) =700	
	B	(3000-2200)/(2-1)=800	
	C	(600-600)/(3-3)=0	
	D	**(2820-2500)/(8-4)=80**	
	E	(1200-900)/(6-3)=100	
	F	(4900-3400)/(3-2)=1500	
	G	(2000-1600)/(4-2)=200	
	Crash Activity D b/c it has the lowest cost		
d)	A - D - G is the critical path		
	A	4 - 3=1	
	D	8 - 4=4	
	G	4 - 2=2	
	1 + 4 + 2 = 7 weeks		
	A - D - G - E		
	(1 x 700) + (4 x 80) + (200 x 2) + (1 x 100) = 1520		

Concept Question 5.4

Which of the following steps is NOT a basic step followed by PERT and CPM?

- A. Compute the critical path.
- B. Draw the network connecting all the activities.
- C. Identify and eliminate non-critical activities. ✔
- D. Define the project.

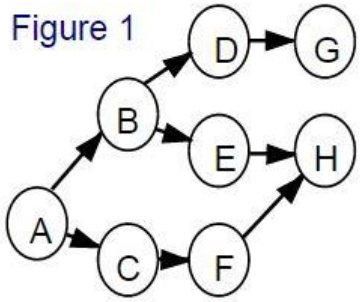
Problem 3.5a

In the following table the activities with their precedence sequence and expected time (days) are listed for a project on which Carl Betterton's construction company is working:

Activity	Immediate Predecessor(s)	Time (days)
A	–	3
B	A	4
C	A	6
D	B	6
E	B	4
F	C	4
G	D	6
H	E, F	8

The correct precedence diagram for the project is shown in Figure 1 .

Figure 1



Problem 3.10b

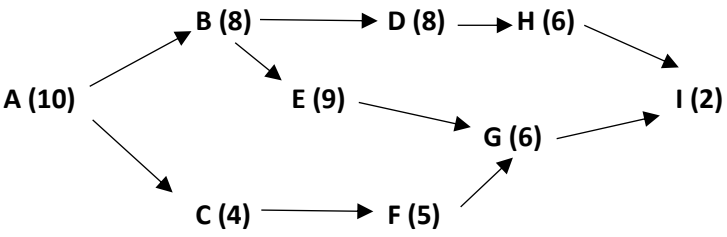
The activities described by the following table are given for the Howard Corporation in Kansas:

Activity	Time (in weeks)	Immediate Predecessor(s)	Activity	Time (in weeks)	Immediate Predecessor(s)	Activity	Time (in weeks)	Immediate Predecessor(s)
A	10	–	D	8	B	G	6	E, F
B	8	A	E	9	B	H	6	D
C	4	A	F	5	C	I	2	G, H

This exercise contains only parts b and c.

b) The activities on the critical path are A - B - E - G - I .

c) The total project completion time for Howard Corporation is 35 weeks. (*Enter your response as a whole number.*)



A – B – E – G – I ➔ 10 + 8 + 9 + 6 + 2 =**35 weeks**