

# Week 4 Homework: AIB Problems

In this homework you be working through four Activity In Box (AIB) problems. Using the activity, duration, and predecessor information given in this document, you should first construct a network for each "project." [Each problem will have its own network.]

Once you have constructed the networks, you will log into the "Homework Exam" in Week 4 and input the answers to the homework questions.

## Problem 1

The following data were obtained from a project to create a new portable electronic.

<u>Activity</u>	<u>Duration</u>	<u>Predecessors</u>
A	3 Days	---
B	4 Days	---
C	6 Days	---
D	2 Days	A, B
E	1 Days	C
F	3 Days	D
G	3 Days	E, F
H	7 Days	D
I	10 Days	G

Construct a network for the project. Then review and answer the multi-part question found on the Homework tab in Week 4.

## Problem 2

The following data were obtained from a project to build a pressure vessel:

<u>Activity</u>	<u>Duration</u>	<u>Predecessors</u>
A	4 weeks	---
B	4 weeks	---
C	3 weeks	B
D	2 weeks	A, C
E	3 weeks	B
F	5 weeks	D, E, G
G	2 weeks	B
H	6 weeks	F
I	3 weeks	G
J	1 week	I

Construct a network for the project. Then review and answer the multi-part question found on the Homework tab in Week 4.

## Week 4 Homework: AIB Problems

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### Problem 3

The following data were obtained from a project to design a new software package:

<u>Activity</u>	<u>Duration</u>	<u>Predecessors</u>
A	3 Days	---
B	6 Days	---
C	4 Days	A
D	2 Days	C, B
E	3 Days	A
F	2 Days	D, E, G
G	2 Days	B, C
H	1 Day	G

Construct a network for the project. Then review and answer the multi-part question found on the Homework tab in Week 4.

### Problem 4

The following data were obtained from an in-house MIS project:

<u>Activity</u>	<u>Duration</u>	<u>Predecessors</u>
A	3 Days	---
B	6 Days	---
C	3 Days	A
D	2 Days	B
E	3 Days	B
F	1 Day	C, D
G	5 Days	C, D
H	4 Days	E, F, G
I	7 Days	E, F

Construct a network for the project. Then review and answer the multi-part question found on the Homework tab in Week 4.

For Problem #1, provide answers for the following seven-part question:

- (A.) What is the Scheduled Completion of the Project?
- (B.) What is the Critical Path of the Project?
- (C.) What is the EST for Activity D?
- (D.) What is the LST for Activity G?
- (E.) What is the EF for Activity B?
- (F.) What is the LF for Activity H?
- (G.) What is the float for Activity I?

2. For Problem #2, provide answers to the following two-part question:

- (A.) Calculate the scheduled completion time and identify the critical path.
- (B.) What is the slack time (float) for activities A, D, E, and G?

3. For Problem #3, provide answers to the following two-part question:

- (A.) Calculate the scheduled completion time and identify the critical path(s).
- (B.) What is the slack time (float) for activities B, D, E, and G?

4. For Problem #4, provide answers to the following two part question:

- (A.) Calculate the scheduled completion time and identify the critical path.
- (B.) What is the slack time (float) for activities A, D, E, and F?

**SCHEDULING AND PROBABILITY**

Given the following-activity list and times (in days):

Activity	Optimistic Time (a)	Pessimistic Time (b)	Most Likely Time (m)
A	7	12	10
B	5	12	9
C	6	14	8
D	12	21	14
E	2	5	4
F	4	8	5
G	10	15	12
H	1	8	3
I	3	8	5
J	8	14	10
K	9	16	12
L	12	17	15

- A: Calculate the expected time (TE) for critical path activities A-D-I
- B: Calculate the scheduled duration (S) for the project.  $\Rightarrow$  sum of the expected time 29.8
- C: What is the probability of the project being complete in a desired time (D) of 35 days?
- D: What is the probability of the project being complete in a desired time (D) of 28 days?

(A) 
$$\text{Variance (V)} = [(b-a)/6]^2 \qquad Z = (D - S) / \sqrt{V_1} \qquad TE = (a+4m+b) / 6$$

AD+I critical path activities Expected times

Formula:  $TE = \frac{P + (4m) + O}{6}$

$A = \frac{7 + (4 \times 10) + 12}{6} = 9.8 \text{ days}$

$D = \frac{21 + (4 \times 14) + 12}{6} = 14.8 \text{ days}$

$I = \frac{8 + (4 \times 5) + 3}{6} = 5.2 \text{ days}$

29.8 days

Scheduled duration  $\nearrow$  for the project

② take the variance

$$\text{Formula} \Rightarrow \left( \frac{P-O}{6} \right)^2$$

$$\textcircled{A} \left( \frac{12-7}{6} \right)^2 = 0.69$$

$$\textcircled{D} \left( \frac{21-12}{6} \right)^2 = 2.25$$

$$\textcircled{I} \left( \frac{8-3}{6} \right)^2 = 0.69$$

3.64 (sum of variances)

$$\sqrt{3.64} = 1.91$$

What is the probability of project being completed in 35 days

⊕ desired time is 35 days

$$\frac{35 - 29.8}{1.91} = 2.71$$

$$\frac{\text{desired time} - \text{scheduled time}}{\sqrt{\quad}}$$

$$2.71 \Rightarrow 99.6$$

$$\textcircled{B} \frac{\text{desired time} - \text{scheduled time}}{\sqrt{\quad}}$$

even though you get negative number go to positive

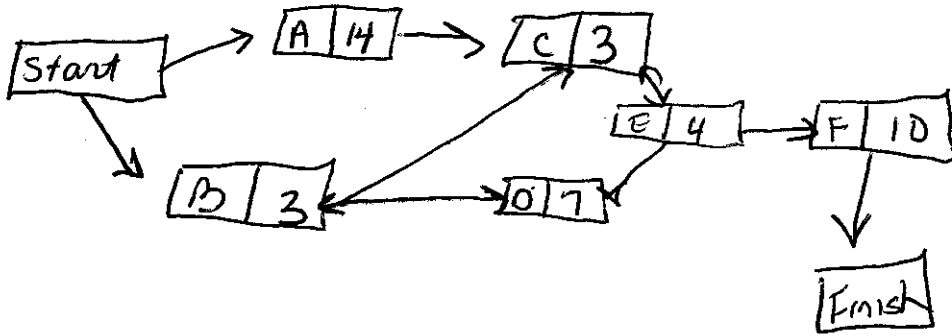
$$\frac{28 - 29.8}{1.91} = -0.96$$

$$+0.96 = 0.8315$$

$$1 - 0.8315 = 16.85\%$$

To create an activity node

AON network (PDM)



calculate critical path

Project Duration

Paths to the network

$A \rightarrow C \rightarrow E \rightarrow \text{Finish}$   
 $(14) (3) (4) (10) = 31 \text{ weeks}$

$B \rightarrow C \rightarrow E \rightarrow F$   
 $(3) (3) (4) (10) = 20$

$B \rightarrow D \rightarrow E \rightarrow F$   
 $(3) (7) (4) (10) = 24$

What is the critical path?

\* Longest path through the network is the ~~critical path~~ shortest time to complete the project!

Critical path: A-C-E-F  
 Duration: 31 weeks

\* 17 \* 21

$A-C-E-F = 31$   $LF = EF + \text{Slack}$

$B-C-E-F = 20$

$B-D-E-F = 24$

10

Activity	ES	EF	LS	LF	Slack
A	0	14	0	14	0
B	0	3	7	10	$31-24=7$ 7
C	14	17	14	17	0
D	3	10	10	17	0
E	*17	21	17	21	0
F	*31	31	21	31	0

E cannot start until C, D, B are finished  
 Longest duration to get to that activity

