

College of Engineering
Expanded Tertiary Education Equivalency and Accreditation Program

Name: _____

Score/Grade: _____

Schedule: _____

Date of Submission: _____

Subject: **Operations Research 1**

Section: _____

Topic: Project Management
Assignment No.3

Instruction: Solve the following problem using PERT or CPM.

1. The Sofia Academy is considering building a new athletic complex on campus. The complex would provide a new gymnasium for inter-school sports activities, expanded office space, classrooms, and intramural facilities. The following activities would have to be undertaken before construction starts.

Activity	Description	Immediate Predecessor	Time (Weeks)
A	Survey building site	---	6
B	Develop initial design	---	8
C	Obtain board approval	A, B	10
D	Select architect	C	5
E	Establish budget	C	6
F	Finalize design	D, E	14
G	Obtain financing	E	13
H	Hire contractor	F, G	7

- a. Construct the project network
- b. Determine the critical path
- c. Find the completion time of the project
- d. Make a Gantt chart of the activities

2. A promoter of championship boxing match must perform the task shown in the table before the boxing match can be held (all durations in days).

Activity	Description	Immediate Predecessor	Time (in days)
A	Find site	---	5
B	Find engineers	A	6
C	Hire announcer and referee	A	2
D	Look for sponsorships	A	15
E	Set TV and radio ads	D	20
F	Set up ticket agents	B, C, D	3
G	Print advertising	E, F	2
H	Set up transportation	F	1
I	Last minute details	H	1

- a. Construct the project network
- b. Determine the critical path
- c. Find the completion time of the project
- d. Make a Gantt chart of the activities

3. Consider the list of activities and predecessors that are involved in constructing a house in the table below.
- Draw a network diagram and determine the expected project completion time
 - What is the probability that the project completion time will meet the 35-day deadline?
 - Make the gantt chart of the project.

Activity	Description	Immediate Predecessor	a	m	b
A	Build foundation	--	4	5	6
B	Build walls and ceilings	A	7	9	11
C	Build roof	B	9	11	13
D	Do electrical wiring	B	4	5	6
E	Do water lining	B	2	4	6
F	Put in windows	B	2	3	4
G	Put on sliding	F	4	6	8
H	Floor tiling	D, E	2	3	4
I	Paint house	C, G, H	2	4	6

4. Consider the project information in the table (time in weeks)

Activity	Immediate Predecessor	a	m	b
A	--	5	10	15
B	A	11	15	19
C	A	13	17	21
D	B, C	14	16	21
E	C	8	18	22
F	D	9	13	17
G	E, F	6	11	16

- Construct the PERT network diagram for this project.
- Compute the mean and variance in time for each activity
- Find the critical path and determine the expected length of the critical path?
- Assuming normality and path independence, what is the probability of meeting the 72-week deadline?

	A	B	C	D	E	F
1	90	96	122	110	95	126
2	98	123	97	118	122	99
3	110	120	115	108	132	118
4	120	117	130	118	119	110
5	115	111	114	96	127	124
6	125	105	96	116	115	110

	A	B	C	D	E	F
1	0	6	32	20	5	36
2	1	26	0	21	25	2
3	2	12	7	0	24	10
4	10	7	20	8	9	0
5	19	15	18	0	31	28
6	29	9	0	20	19	14

COLUMN
MINIMUM

0 6 0 0 5 0

	A	B	C	D	E	F
1	0	0	32	20	0	36
2	1	20	0	21	20	2
3	2	6	7	0	19	10
4	10	1	20	8	4	0
5	19	9	18	0	26	28
6	29	3	0	20	14	14

	A	B	C	D	E	F
1	0	0	33	21	0	37
2	0	19	0	21	19	2
3	1	5	7	0	18	10
4	9	0	20	8	3	0
5	18	8	18	0	25	28
6	28	2	0	20	13	14

	A	B	C	D	E	F
1	2	0	35	23	0	37
2	0	17	0	21	17	0
3	1	3	7	0	16	8
4	11	0	22	10	3	0
5	18	6	18	0	23	26
6	28	0	0	20	11	12

	A	B	C	D	E	F
1	2	0	35	24	0	37
2	0	17	0	23	17	0
3	0	2	6	0	15	7
4	11	0	22	11	3	10
5	17	5	17	0	22	25
6	28	0	0	21	11	12

Employee	Shirts
1	95
2	99
3	110
4	117
5	96
6	96

Optimal Assignment

613 shirts/ week is the maximize no.

		WORKERS			
JOBS		1	2	3	4
	A	1	19	10	4
	B	6	2	7	19
	C	31	12	11	8
	D	12	19	17	3

Row Minimum

- 1
- 6
- 8
- 3

		1	2	3	4
A	0	18	9	3	
B	0	15	1	13	
C	23	4	3	0	
D	9	16	14	0	

Column Minimum

	1	2	3	4
A	0	14	18	3
B	0	11	0	13
C	23	0	2	0
D	9	12	13	0

JOBS	WORKERS
A	1
B	7
C	12
D	3

23

1.

A.

MAXIMUM CRITERION		
Dwelling Type	Worst Pay off	Decision
Single Family	70	Single Family
Apartment	50	
Condominiums	-20	

B.

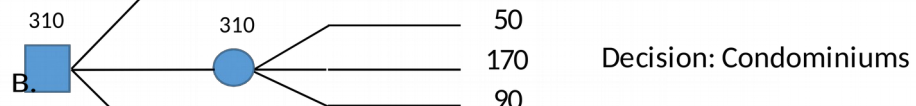
LIKELY CRITERION		
Dwelling Type	Average Payoff	Decision
Single Family	87	Apartment
Apartment	103	
Condominiums	100	

C. If the construction manager were an optimist

MAXIMAX CRITERION		
Dwelling Type	Best Pay off	Decision
Single Family	100	Condominiums
Apartment	170	
Condominiums	220	

A.

MAXIMAX CRITERION		
Decision Tree	Best	Decision
Alternative A	65	Alternative D
Alternative B	130	
Alternative C	80	
Alternative D	220	



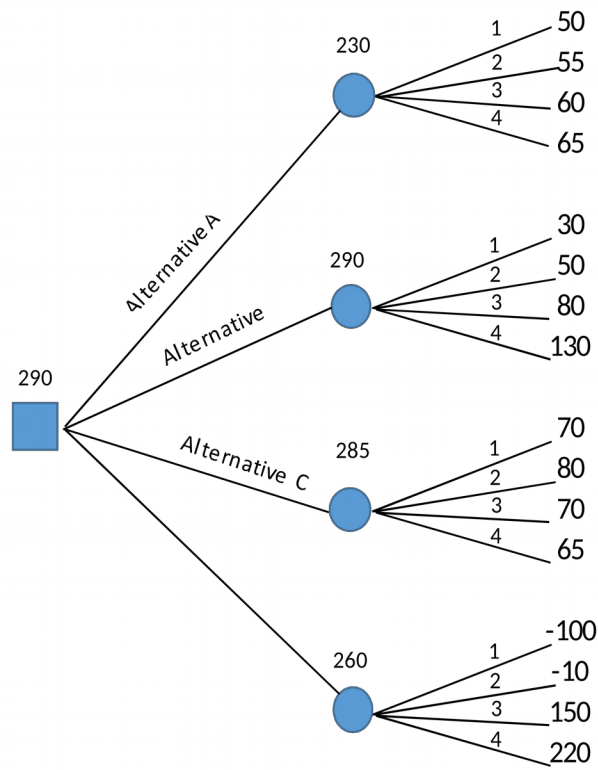
MAXIMIM CRITERION			
Alternative	Best	worst	Decision
Alternative A	50	-20	Alternative C
Alternative B	30	100	
Alternative C	65	220	
Alternative D	-100		

C.

EQUALLY LIKELY		
Alternative	AVERAGE	Decision
Alternative A	58	Alternative B
Alternative B	73	
Alternative C	71	
Alternative D	65	

2.

D. Decision Tree



Decision: Alternative B

	1	2	3	4
Alternative A	50	50	70	60
Alternative B	30	50	80	130
Alternative C	70	80	70	60
Alternative D	40	-10	150	220
Probability	0.1	0.2	0.4	0.3

EMV

61

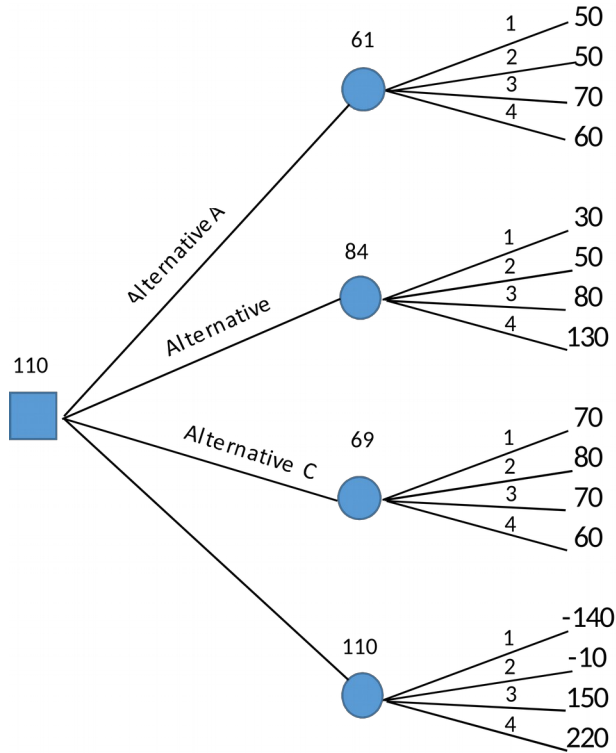
84

69

110

Best EV

Decision: Alternative D



Decision: Alternative D