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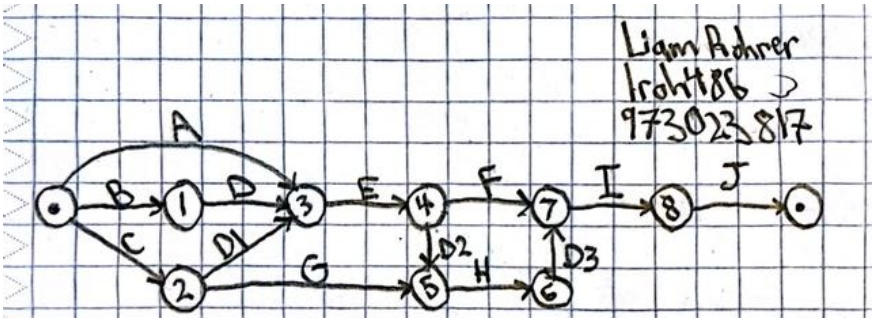
STATS 255 Assignment 3

1.

a.

TASK	PREDECESSORS
A	-
B	-
C	-
D	B
E	A, C, D
F	E
G	C
H	E, G
I	H, F
J	I

b.



c.

Project Management PERT

Add Activity | Delete Activity

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Home Construction

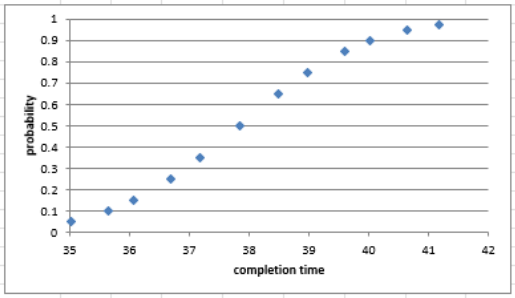
activity	from	to	a	m	b
A	.	3	3	4	5
B	.	1	4	5	9
C	.	2	1	1	2
D	1	3	6	8	9
E	3	4	3	4	6
F	4	7	10	12	17
G	2	5	5	7	9
H	5	6	2	3	5
I	7	8	3	4	5
J	8	.	2	4	5
D1	2	3	0	0	0
D2	4	5	0	0	0
D3	6	7	0	0	0

	EST	EFT	LST	LFT	slack	expected task time	std deviation	variance
A	0.000	4.000	9.333	13.333	9.333	4.000	0.333	0.111
B	0.000	5.500	0.000	5.500	0.000	5.500	0.833	0.694
C	0.000	1.167	12.167	13.333	12.167	1.167	0.167	0.028
D	5.500	13.333	5.500	13.333	0.000	7.833	0.500	0.250
E	13.333	17.500	13.333	17.500	0.000	4.167	0.500	0.250
F	17.500	30.000	17.500	30.000	0.000	12.500	1.167	1.361
G	1.167	8.167	19.833	26.833	18.667	7.000	0.667	0.444
H	17.500	20.667	26.833	30.000	9.333	3.167	0.500	0.250
I	30.000	34.000	30.000	34.000	0.000	4.000	0.333	0.111
J	34.000	37.833	34.000	37.833	0.000	3.833	0.500	0.250
D1	1.167	1.167	13.333	13.333	12.167	0.000	0.000	0.000
D2	17.500	17.500	26.833	26.833	9.333	0.000	0.000	0.000
D3	20.667	20.667	30.000	30.000	9.333	0.000	0.000	0.000

expected project completion time	37.833
variance of project completion time	2.917
std deviation of project completion time	1.708

probability to complete the project in a time of at most 30 time units is 2.251E-06

to complete project with a certainty of alpha 0.7 target completion time is 38.7289164



completion time	completion probability
41.18	0.975
40.64	0.95
40.02	0.90
39.60	0.85
38.99	0.75
38.49	0.65
37.83	0.50
37.18	0.35
36.68	0.25
36.06	0.15
35.64	0.10
35.02	0.05

d. Critical path: B ➔ D ➔ E ➔ F ➔ I ➔ J

e. They should allow 41.806 days for the project to be 99% sure it will be done in time.

f. The director should not be worried about a 12 day increase for this activity. The costume design and making step has a slack time of 18.667 days, which means that the activity duration can increase up to this amount before the overall project completion time is affected.

2.

a.

	AM	AN	AO	AP	AQ	AR	AS	AT	AU
1									Liam Rohrer
2									lroh486
3									973023817
4	**Activity:**	A	B	C	D	E	F		
5	**Reduction:**	0	2	4	0	1	0		
6									
7	**MIN:**	1	2	3	4	5	6	=SUMPRODUCT(AN5:AS5, AN7:AS7)	
8	**Constraints:**	=AN5	<=	6					
9		=AO5	<=	5					
10		=AP5	<=	4					
11		=AQ5	<=	3					
12		=AR5	<=	2					
13		=AS5	<=	1					
14	**Node 0**	=AN26	=	0					
15	**Node 1**	=AO26	>=	=AN17					
16	**Node 1**	=AO26	>=	=AN14+15-AN5					
17	**Node 2**	=AP26	>=	=AN14+17-AO5					
18	**Node 3**	=AQ26	>=	=AN14+19-AP5					
19	**Node 4**	=AR26	>=	=AN17					
20	**Node 4**	=AR26	>=	=AN18+7-AR5					
21	**Node 5**	=AS26	>=	=AN15+9-AQ5					
22	**Node 5**	=AS26	>=	=AN19+3-AS5					
23	**Node 5**	=AS26	<=	24					
24									
25	**Node:**	**0**	**1**	**2**	**3**	**4**	**5**		
26	**EST:**	0	15	15	15	21	24		

Objective Cell (Min)

Cell	Name	Original Value	Final Value
$AT$7	MIN:	21	21

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9.73E+08

Variable Cells

Cell	Name	Original Value	Final Value	Integer
$AN$5	Reduction: A	0	0	Contin
$AO$5	Reduction: B	2	2	Contin
$AP$5	Reduction: C	4	4	Contin
$AQ$5	Reduction: D	0	0	Contin
$AR$5	Reduction: E	1	1	Contin
$AS$5	Reduction: F	0	0	Contin
$AN$26	EST: A	0	0	Contin
$AO$26	EST: <=	15	15	Contin
$AP$26	EST: C	15	15	Contin
$AQ$26	EST: D	15	15	Contin
$AR$26	EST: E	21	21	Contin
$AS$26	EST: F	24	24	Contin

Constraints

Cell	Name	Cell Value	Formula	Status	Slack
$AN$14	Node 0 A	0	$AN$14=$AP$14	Binding	0
$AN$15	Node 1 A	15	$AN$15>=$AP$15	Binding	0
$AN$16	Node 1 A	15	$AN$16>=$AP$16	Binding	0
$AN$17	Node 2 A	15	$AN$17>=$AP$17	Binding	0
$AN$18	Node 3 A	15	$AN$18>=$AP$18	Binding	0
$AN$19	Node 4 A	21	$AN$19>=$AP$19	Not Binding	6
$AN$20	Node 4 A	21	$AN$20>=$AP$20	Binding	0
$AN$21	Node 5 A	24	$AN$21>=$AP$21	Binding	0
$AN$22	Node 5 A	24	$AN$22>=$AP$22	Binding	0
$AN$23	Node 5 A	24	$AN$23<=$AP$23	Binding	0
$AN$8	Constraints: A	0	$AN$8<=$AP$8	Not Binding	6
$AN$9	C A	2	$AN$9<=$AP$9	Not Binding	3
$AN$10	D A	4	$AN$10<=$AP$10	Binding	0
$AN$11	E A	0	$AN$11<=$AP$11	Not Binding	3
$AN$12	F A	1	$AN$12<=$AP$12	Not Binding	1
$AN$13	A	0	$AN$13<=$AP$13	Not Binding	1

b. Tasks to be crashed: B by 2 days, C by 4 days, and E by 1 day

c.

Project Duration (days)	Total Crash Cost ($)	Marginal Crash Cost ($/day)
29	0	N/A
28	3	3
27	6	3
26	9	3
25	14	5
24	21	7
23	29	8

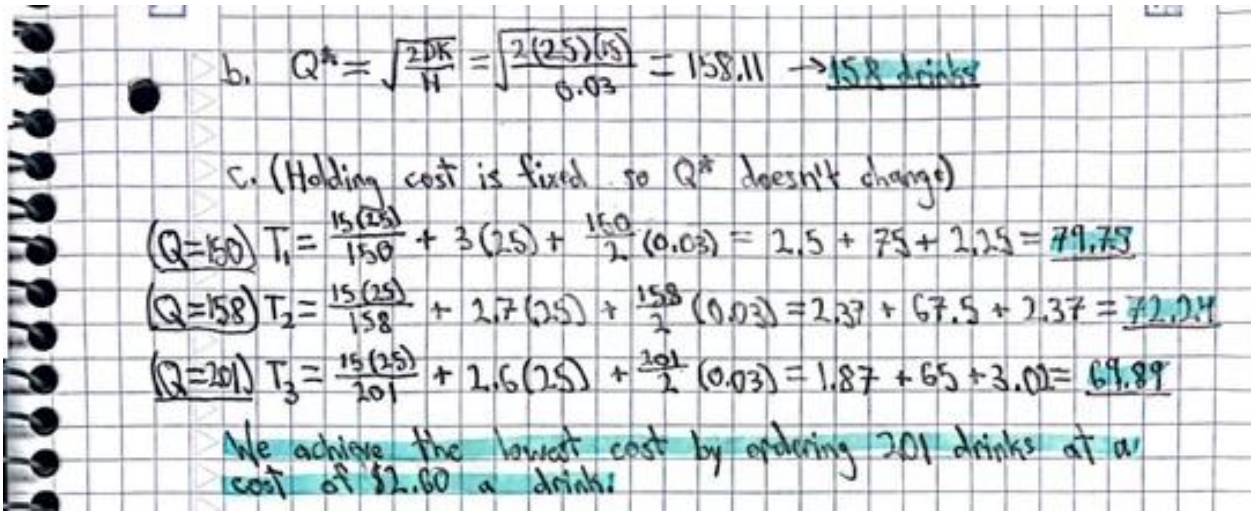
d. Marginal costs tend to increase as crash time increases.

3.

a. A deterministic EOQ is the most appropriate inventory model for this situation.
   D = 25
   C = 3
   K = 15
   L = 3
   H = 0.03

b. (shown below)

c. (shown below)



d. A deterministic POQ is the most appropriate inventory model for this situation.

e. (shown below)

f. (shown below)

g. (shown below)