BUAD 306

Second Practice Exam 2

1. (60 points)

Four Wal-Mart distribution centers generally supply goods to four retail outlets in a southern state. Each of the distribution centers can provide the amounts shown below in the table. Demand from the four retail outlets is also provided in the table below. The shipping costs vary between different pairs of distribution center and retail store. The cost for each combination is given below.

Distrib center \ Retail Out	A	B	C	D	
1	75 [5]	[7]	[10]	[5]	75
2	50 [6]	100 [5]	25 [8]	[2]	175
3	[6]	[6]	100 [12]	[7]	100
4	[8]	[5]	25 [14]	125 [4]	150
Demand	125	100	150	125	500 / 500

5(75) = 300
5(6) = 300
100(5) = 500
25(8) = 200
100(12) = 1200
25(14) = 350
125(4) = 500
3350

a. (15 points)

Find any initial feasible solution to this problem (show your solution in the table above). What is the cost of this solution? What are the pros and cons of the solution method that you have used here?

Pros - easy, fast

Cons - does not consider cost

b. (15 points)

Now find an initial feasible solution using the Difference method in the table below. What is the cost of this solution? How does this compare to the solution found in part (a)?

Distrib center \ Retail Outl	A	B	C	D	
1	5	7	75 10	5	75
2	6	5	50 8	125 2	175
3	100 6	6	12	7	100
4	25 8	100 5	25 14	4	150
Demand	125	100	150	125	

100(6) = 600
25(8) = 200
100(5) = 500
75(10) = 750
50(8) = 400
25(14) = 350
125(2) = 250
3050

Lower cost

c. (10 pts.)

Using the solution shown below, determine how much Wal-Mart would either save or lose by moving a single unit into Cell B3. Explain why this makes sense. Should units be shipped via route B3? If so, how many units should be moved to that cell?

Distrib center \ Retail Outl	A	B	C	D	
1	25 5	7	10	50 5	75
2	6	5	150 8	25 2	175
3	100 6	6	12	7	100
4	8	100 5	14	50 4	150
Demand	125	100	150	125	

+6
-5
+4
-8
+5
-6
-1

Will save $1.00

More 50 units

d. (15 pts.)

Is the solution shown below the optimal solution to this problem? How do you know? Provide complete support for your answer.

Distrib center \ Retail Out	A	B	C	D	
1	25 [5]	+2 [7]	50 [10]	+1 [5]	75
2	+3 [6]	+2 [5]	100 [8]	75 [2]	175
3	100 [6]	0 [6]	+1 [12]	+2 [7]	100
4	+3 [8]	100 [5]	+4 [14]	50 [4]	150
Demand	125	100	150	125	

+20

+19

+23
-23

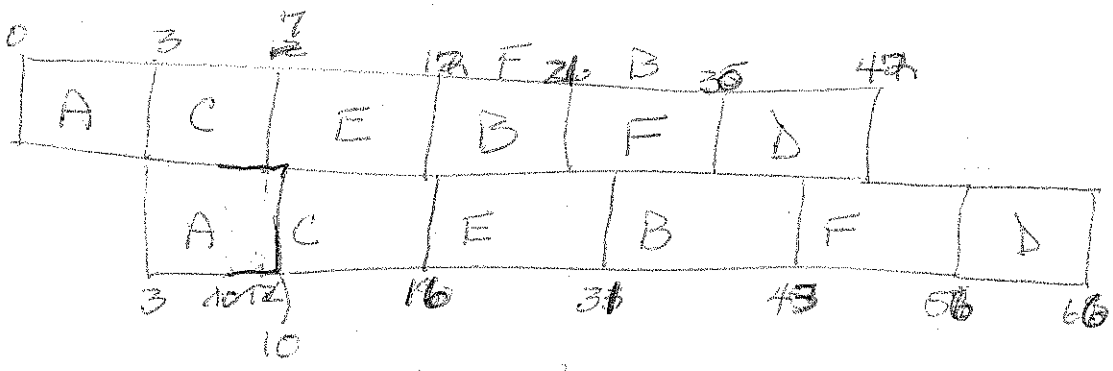
+20

Yes optimal

2. (40 points)
Processing times for six jobs, all required to go through two stages at two work centers, are given below. Determine the sequence of jobs that will minimize total throughput time and total idle time.

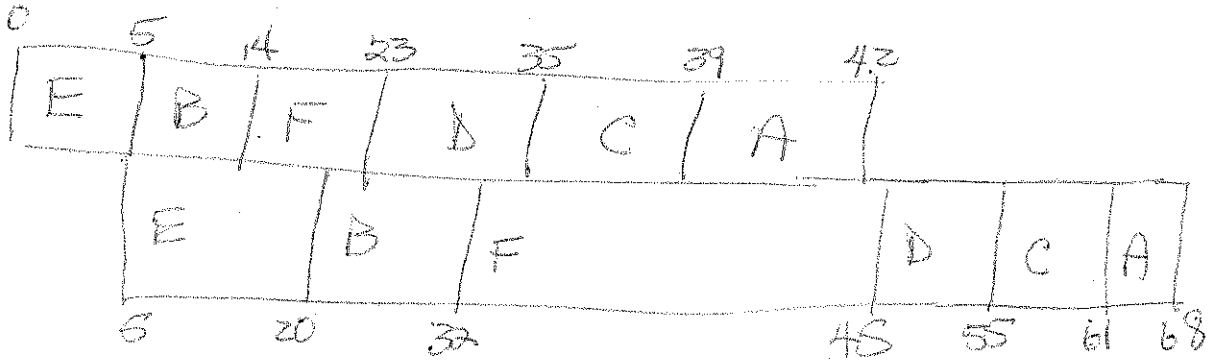
Job	Stage 1 (days)	Stage 2 (days)
A	3	7
B	9	12
C	4	6
D	12	10
E	5	15
F	9	13

a. (25 pts)
What is the total throughput time and total idle time for this sequence?



TP time = 66 days
Idle = 0 days

b. (15 points)
Currently the firm is completing these jobs using the sequence, E, B, F, D, C, A. How much time is saved by using the sequence you found to be best in (a) compared to this sequence?



Save 2 days
(66 vs. 68)

3. (50 pts)

Carpet Plus sells and installs floor covering for commercial buildings. Brad Sweeney, a Carpet Plus account executive, was just awarded the contract for four jobs. Brad must now assign a Carpet Plus installation crew to each of the four jobs. Because the commission Brad will earn depends on the profit Carpet Plus makes, Brad would like to determine an assignment that will minimize total installation costs. Currently four installation crews are available for assignment. Each crew is identified by a color code, which aids in the tracking of job progress on a large whiteboard. The table below shows the cost (in hundreds of dollars) for each crew to complete each of the four jobs.

(a) (35 pts)

Find the minimum-cost assignment of crews to jobs (use as many charts as you need). What is the total cost of this assignment?

Cost ($100s)

Crew \ Job	1	2	3	4	
Red	30	32	38	47	-30
White	25	30	45	44	-25
Blue	23	40	37	39	-23
Green	26	38	37	45	-26

Cost ($100s)

Crew \ Job	1	2	3	4	
Red	0	2	8	17	
White	0	5	20	19	
Blue	0	17	14	16	
Green	0	12	11	19	
		-2	-8	-16	

Cost ($100s)

Crew \ Job	1	2	3	4
Red	0	0	0	1
White	0	3	12	3
Blue	0	15	6	0
Green	0	10	3	3

-3

Cost ($100s)

Crew \ Job	1	2	3	4
Red	3	0	0	4
White	0	0	9	3
Blue	0	12	3	0
Green	0	7	0	3

26 R-1
32 W-2
37 B-4
39 G-3
133

Cost ($100s)

Crew \ Job	1	2	3	4
Red			0	
White		0		
Blue				0
Green	0			

or

26 R-3
30 W-2
38 B-4
39 G-1
133

Cost ($100s)

Crew \ Job	1	2	3	4
Red				
White				
Blue				
Green				

(b) (15 pts)
How many optimal assignments are there for this problem? How do you know this?

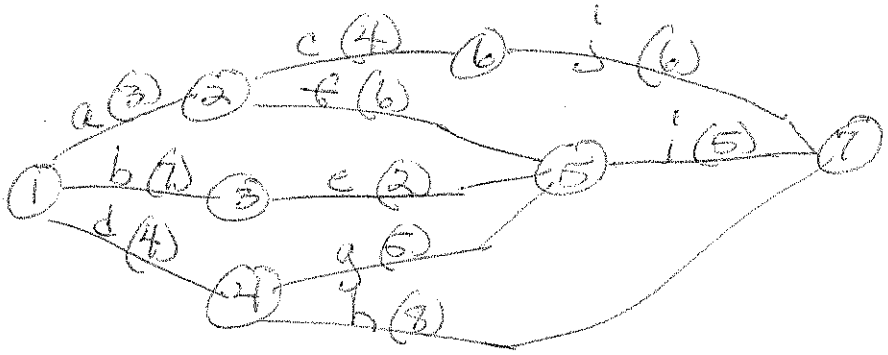
2 optimal solutions
Can find 2 assignments with same cost.

4. (50 points)

The US Cable Company is working on a project for a client for a new, composite-based cable covering. The project is due in 2 weeks (14 days). For every day that the company completes the project ahead of schedule (i.e., in less than 14 days), it receives a bonus in the amount of $500. The table below provides the data regarding this project.

Activity	Predecessor Activity	Days t_o	Days t_e	Days t_p	Crash Cost (per day)	
a	--	1	3	5	$300	≤ 1
b	--	5	7	8	50	≤ 10
c	a	4	4	6	---	
d	--	4	4	8	---	
e	b	2	2	4	---	
f	a	5	6	10	150	≤ 0
g	d	3	5	6	150	≤ 10
h	d	5	8	11	500	3
i	f,e,g	4	5	6	400	1
j	c	4	6	8	100	2

a. (15 pts.) Draw a PERT diagram for this order, using t_e as the expected time for each activity.



b. (10 points) How long will it take to complete this project with no crashing? Explain. Which path in this problem determines the length of the project?

acgj 13
afi 14 *
bei 14 *
dgi 14 *
dh 12

c. (12 points) What is the probability that this project will be completed within 12 days (with no crashing)? Show all work.

$\sigma_A^2 = \left(\frac{6-1}{6}\right)^2 = \frac{16}{36}$

$\sigma_b^2 = \left(\frac{8-5}{6}\right)^2 = \frac{9}{36}$

$\sigma_d^2 = \left(\frac{8-4}{6}\right)^2 = \frac{16}{36}$

$\sigma_e^2 = \left(\frac{4-2}{6}\right)^2 = \frac{4}{36}$

$\sigma_f^2 = \left(\frac{10-5}{6}\right)^2 = \frac{25}{36}$

$\sigma_g^2 = \left(\frac{6-3}{6}\right)^2 = \frac{9}{36}$

$\sigma_i^2 = \left(\frac{6-4}{6}\right)^2 = \frac{4}{36}$ $\quad \frac{83}{36} = 2.31$

$z = \frac{12-14}{\sqrt{2.31}} = \frac{-2}{1.52} = -1.32$

Prob. $= .5 - .4066$

$= .0934$

d. (13 points) For how many days should US Cable Company expedite this project, taking into consideration both the bonus amount and the costs of crashing? Show all work and steps, and explain completely what you would recommend and why.

Bonus = $500

acj	13 12
aei	14 13 12
bei	14 13 12
dgi	14 13 12
dh	12

1) Crash f, b, g $350

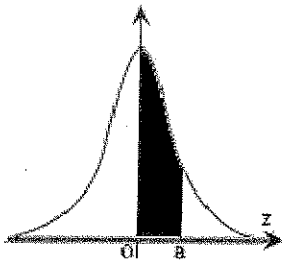
2) Crash a, b, g (or i + j) 500

$850

Too expensive after that

I promise that I have neither given nor received nor asked for help on this exam. All work presented here is my own work only, of which I am proud.

Signature: _____



Normal Distribution Table

a	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09
0.0	0.0000	0.0040	0.0080	0.0120	0.0160	0.0199	0.0239	0.0279	0.0319	0.0359
0.1	0.0398	0.0438	0.0478	0.0517	0.0557	0.0596	0.0636	0.0675	0.0714	0.0753
0.2	0.0793	0.0832	0.0871	0.0910	0.0948	0.0987	0.1026	0.1064	0.1103	0.1141
0.3	0.1179	0.1217	0.1255	0.1293	0.1331	0.1368	0.1406	0.1443	0.1480	0.1517
0.4	0.1554	0.1591	0.1628	0.1664	0.1700	0.1736	0.1772	0.1808	0.1844	0.1879
0.5	0.1915	0.1950	0.1985	0.2019	0.2054	0.2088	0.2123	0.2157	0.2190	0.2224
0.6	0.2257	0.2291	0.2324	0.2357	0.2389	0.2422	0.2454	0.2486	0.2517	0.2549
0.7	0.2580	0.2611	0.2642	0.2673	0.2704	0.2734	0.2764	0.2794	0.2823	0.2852
0.8	0.2881	0.2910	0.2939	0.2967	0.2995	0.3023	0.3051	0.3078	0.3106	0.3133
0.9	0.3159	0.3186	0.3212	0.3238	0.3264	0.3289	0.3315	0.3340	0.3365	0.3389
1.0	0.3413	0.3438	0.3461	0.3485	0.3508	0.3531	0.3554	0.3577	0.3599	0.3621
1.1	0.3643	0.3665	0.3686	0.3708	0.3729	0.3749	0.3770	0.3790	0.3810	0.3830
1.2	0.3849	0.3869	0.3888	0.3907	0.3925	0.3944	0.3962	0.3980	0.3997	0.4015
1.3	0.4032	0.4049	0.4066	0.4082	0.4099	0.4115	0.4131	0.4147	0.4162	0.4177
1.4	0.4192	0.4207	0.4222	0.4236	0.4251	0.4265	0.4279	0.4292	0.4306	0.4319
1.5	0.4332	0.4345	0.4357	0.4370	0.4382	0.4394	0.4406	0.4418	0.4429	0.4441
1.6	0.4452	0.4463	0.4474	0.4484	0.4495	0.4505	0.4515	0.4525	0.4535	0.4545
1.7	0.4554	0.4564	0.4573	0.4582	0.4591	0.4599	0.4608	0.4616	0.4625	0.4633
1.8	0.4641	0.4649	0.4656	0.4664	0.4671	0.4678	0.4686	0.4693	0.4699	0.4706
1.9	0.4713	0.4719	0.4726	0.4732	0.4738	0.4744	0.4750	0.4756	0.4761	0.4767
2.0	0.4772	0.4778	0.4783	0.4788	0.4793	0.4798	0.4803	0.4808	0.4812	0.4817
2.1	0.4821	0.4826	0.4830	0.4834	0.4838	0.4842	0.4846	0.4850	0.4854	0.4857

2.2	0.4861	0.4864	0.4868	0.4871	0.4875	0.4878	0.4881	0.4884	0.4887	0.4890
2.3	0.4893	0.4896	0.4898	0.4901	0.4904	0.4906	0.4909	0.4911	0.4913	0.4916
2.4	0.4918	0.4920	0.4922	0.4925	0.4927	0.4929	0.4931	0.4932	0.4934	0.4936
2.5	0.4938	0.4940	0.4941	0.4943	0.4945	0.4946	0.4948	0.4949	0.4951	0.4952
2.6	0.4953	0.4955	0.4956	0.4957	0.4959	0.4960	0.4961	0.4962	0.4963	0.4964
2.7	0.4965	0.4966	0.4967	0.4968	0.4969	0.4970	0.4971	0.4972	0.4973	0.4974
2.8	0.4974	0.4975	0.4976	0.4977	0.4977	0.4978	0.4979	0.4979	0.4980	0.4981
2.9	0.4981	0.4982	0.4982	0.4983	0.4984	0.4984	0.4985	0.4985	0.4986	0.4986
3.0	0.4987	0.4987	0.4987	0.4988	0.4988	0.4989	0.4989	0.4989	0.4990	0.4990

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