BE1401 Business Operations and Processes
Solution for Practice Problems for Project Management

Question 1

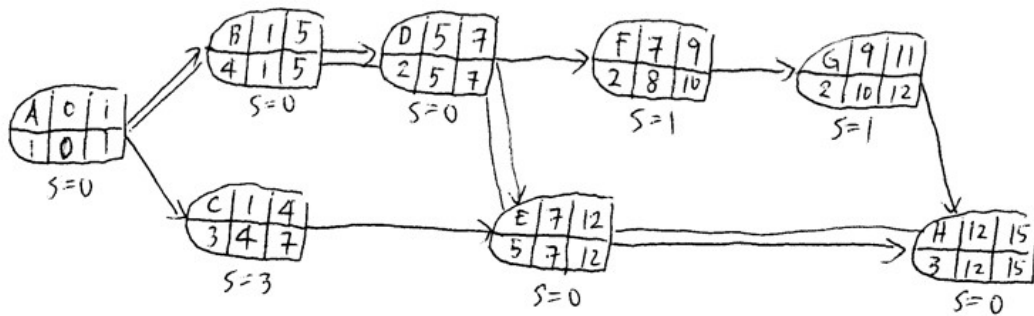| Activity	Activity Predecessor	Time Estimate (weeks)							
		Mean	Variance	ES	EF	LS	LF	SLACK	
A	-	9	4	0	9	0	9	0	<--critical
B	-	11	4	0	11	7	18	7	
C	A	7	1	9	16	11	18	2	
D	A	10	9	9	19	9	19	0	<--critical
E	B,C	1	0	16	17	18	19	2	
F	B,C	5	4	16	21	26	31	10	
G	D,E	6	1	19	25	19	25	0	<--critical
H	D,E	3	1	19	22	21	24	2	
I	H	1	0	22	23	24	25	2	
J	F,G	2	0	25	27	31	33	6	
K	G,I	8	1	25	33	25	33	0	<--critical

Probability that the project will be completed in 40 weeks or less is 96.46%. Probability that the project will be completed within 30 weeks is 21.93%

Question 2

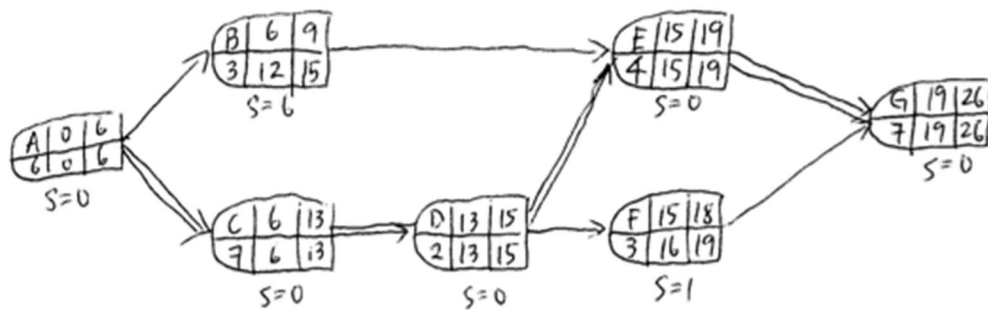| Activity	Mean	Variance	ES	EF	LS	LF	SLACK	
A	4	1.333333333	0	4	0	4	0	<--critical
B	5	0.333333333	4	9	15	20	11	
C	9	3	9	18	20	29	11	
D	13	3	4	17	4	17	0	<--critical
E	8	1.333333333	17	25	21	29	4	
F	12	5.333333333	17	29	17	29	0	<--critical
G	3	0.333333333	29	32	29	32	0	<--critical
H	5	0.333333333	32	37	32	37	0	<--critical
I	4	0.333333333	37	41	37	41	0	<--critical
J	6	1.333333333	32	38	35	41	3	

Critical path is A-D-F-G-H-I and expected completion time is 41. Probability that the project will be completed in 44 weeks or less is 82.08%.

Question 3

Network diagram nodes:

- A | 0 | 1 ; 1 | 0 | 1 — S=0
- B | 1 | 5 ; 4 | 1 | 5 — S=0
- D | 5 | 7 ; 2 | 5 | 7 — S=0
- F | 7 | 9 ; 2 | 8 | 10 — S=1
- G | 9 | 11 ; 2 | 10 | 12 — S=1
- C | 1 | 4 ; 3 | 4 | 7 — S=3
- E | 7 | 12 ; 5 | 7 | 12 — S=0
- H | 12 | 15 ; 3 | 12 | 15 — S=0

(a) The critical path is A – B – D – E – H.

(b) It will take 15 weeks to complete the project.

(c) The following activities have slack.

  C - 3 weeks

  F - 1 week

  G - 1 week.

Question 4

Network diagram nodes:

- A | 0 | 6 ; 6 | 0 | 6 — S=0
- B | 6 | 9 ; 3 | 12 | 15 — S=6
- E | 15 | 19 ; 4 | 15 | 19 — S=0
- G | 19 | 26 ; 7 | 19 | 26 — S=0
- C | 6 | 13 ; 7 | 6 | 13 — S=0
- D | 13 | 15 ; 2 | 13 | 15 — S=0
- F | 15 | 18 ; 3 | 16 | 19 — S=1

(a) The critical path is A – C – D – E – G

(b) It will take 26 weeks to complete the project.

(c) Activity B has a slack of 6 weeks.

Question 5

Mean = 33, standard deviation = 3.87

(a) $P(T > 38) = P(Z > (38-33)/3.87) = P(Z > 1.29) = 1 – P(Z < 1.29) = 1 – 0.9015 = 0.0985$

(b) $P(T > 33) = P(Z > (33-33)/3.87) = P(Z > 0) = 0.5$

(c) $P(T > 28) = P(Z > (28-33)/3.87) = P(Z > -1.29) = 1 – P(Z < -1.29) = 1 – P(Z > 1.29)$ (because of the symmetricity of standard normal distribution about its mean 0) $= P(Z < 1.29) = 0.9015$.

Question 6

Mean = 41, standard deviation = 3.266

(a) Find x such that $0.9 = P(Z \leq (x-41)/3.266)$.
$1.28 = (x-41)/3.266$ (From the normal table, we find that 1.28 is the closest "z value" for which the cumulative probability is approximately 0.9)
$x = (1.28)(3.266) + 41 = 45.18 \approx 46$ weeks

(b) Find x such that $0.99 = P(Z \leq (x-41)/3.266)$.
$2.33 = (x-41)/3.266$ (Again, we find that 2.33 is the closest "z value" for which the cumulative probability is approximately 0.99)
$x = (2.33)(3.266) + 41 = 48.61 \approx 49$ weeks