Cosc 305 Assignment 3:

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Q1:

1. A:

All paths:
ABCF, 2+4+3+3=12 days
ADF, 2+7+3=12 days
AEF, 2+8+3=13 days

AEF is the critical paths

1. B & C:

Task	Task precedence	Length (days)	ES	EF	LS	LF	Slack (LS−ES)
A	_ (start)	2	0	2	0	2	0
B	A - B	4	2	6	3	7	1
C	B - C	3	6	9	7	10	1
D	A - D	7	2	9	3	10	1
E	A - E	8	2	10	2	10	0
F	C, D, E - F	3	10	13	10	13	0

Total Slack = LS − ES = LF − EF

SA = 0-0 = 0
SB = 3-2 = 1
SC = 7-6 = 1
SD = 3-2 = 1
SE = 2-2 = 0
SF = 10-10 = 0

1. D:

Activity	Team member	Day of the week

		M	T	W	Th	F	Sa	S	M	T	W	Th	F	Sa	S	M	T	W	Th	
A	Jill	X	X																	
B	Tom			X	X	X	__	_	X											
C	Jill									X	X	X								
D	Sam			X	X	X	__	_	X	X	X	X								
E	Susan			X	X	X	__	_	X	X	X	X	X							
F	Ken															X	X	X		

1. E:

No - since Tom doesn't start until Jill went on break, & Jill didn't resume until tom finished. In addition, kens work could also be picked up by susan or sam as no overlap exists

So Jill, Tom, & Ken's work can all be mixed into 1 persons workload -- thus only 3 of the 6 are needed

1. F:

Activity	Team member	Day of the week

		M	T	W	Th	F	Sa	S	M	T	W	Th	F	Sa	S	M	T	W	Th	
ABCF	Tom	A	A	B	B	B	__	_	B	C	C	C								
D	Sam			D	D	D	__	_	D	D	D	D								
E	Susan			E	E	E	__	_	E	E	E	E	E	__	_	F	F	F		

I would merge Jill & Tom's work, as well as giving Ken's work to Susan

1. G:

Activity	Team member	Day of the week

		M	T	W	Th	F	Sa	S	M	T	W	Th	F	Sa	S	M	T	W	Th	
ABCF	Tom	A	A	B	B	B	__	_	B	C	C	C								
D	Sam			D	D	D	__	_	D	D	D	D								
E	Susan			E	E	E	__	_	E	E	E	E	E	__	_	F	F	F		

Because of my specific solution to F, it would look the same as Tom can single handedly clear both Their & Jill's work

1. H:

The critical pth is AEF at 13 days, so the only tasks that could reduce the length of the project are A, E, or F

thus the candidates are: A for 1000, $Efor1200$, or F for 1800$

Therefore: I choose task A, as it will reduce the schedule by a day (unlike B C or D) & costs less then E or F for the same 1 day benefit

Q2:

2. A:

pert formula: t_e = (t_o+4t_m+t_p)/6

Task	expected time:	variance:

	(t_e=(t_o+4t_m+t_p)/6)	(\sigma$^{2=((t_p-t_o)/6)}$2)
A	(1 + 4·2 + 3)/6 =**2**	((3−1)/6)^2 =**0.111111**
B	(2 + 4·4 + 6)/6 =**4**	((6−2)/6)^2 =**0.444444**
C	(1 + 4·3 + 5)/6 =**3**	((5−1)/6)^2 =**0.444444**
D	(6 + 4·7 +14)/6 =**8**	((14−6)/6)^2 =**1.777778**
E	(5 + 4·8 +11)/6 =**8**	((11−5)/6)^2 =**1.000000**
F	(1 + 4·3 + 8)/6 =**3.5**	((8−1)/6)^2 =**1.361111**

Expected duration, variance, & SD:

ABCF - 2+4+3+3.5 = 12.5 days
var - 0.111111 + 0.444444 + 0.444444 + 1.361111 = 1.803
sd = sqrt(var) = 1.537
ADF - 2+8+3.5 = 13.5 days
var - 0.111111 + 1.777778 + 1.361111 = 3.250000
sd = sqrt(var) = 1.803
AEF - 2+8+3.5 = 13.5 days
var - 0.111111 + 1.000000 + 1.361111 = 2.472222
sd = sqrt(var) = 1.572

2. B:

Path	optimistic scenario
ABCF	A(1) + B(2) + C(1) + F(1) =**5** days
ADF	A(1) + D(6) + F(1) =**8** days
AEF	A(1) + E(5) + F(1) =**7** days

optimistic total time = max([5, 8, 7]) = 8 days

SD = SD(ADF) = 1.8 days //see 2A

2. C:

Path	pessimistic scenario
ABCF	A(3) + B(6) + C(5) + F(8) =**22** days
ADF	A(3) + D(14) + F(8) =**25** days
AEF	A(3) + E(11) + F(8) =**22** days

pessimistic total time = max([22, 25, 22]) = 25 days

SD = SD(ADF) = 4 days //see 2A

2. D:

I. Probability to complete the project in 18 days

Z-score: Z = X-u / sd = 18-13.67 / 1.8 = 4.33 / 1.8 ~= 2.41

Z 2.41 - 99.2% chance of completing the project in under 18 days

II. Probability to complete the project in 12 days

Z-score: Z = X-u / sd = 12-13.67 / 1.8 = 1.67 / 1.8 ~= 0.93

Z 0.93 - 17.62% chance of completing the project in under 12 days