CPM Homework

Given the information in Table 1, complete the following parts. Identify all activities with letter and node numbers (to help out the grader).

Table 1: Project Summary

Activity	Can start only after completion of activity(s)…	Duration, d (Uncrashed)	Bulldozers	Activity Crash Cost, $/d
A	None	3	8	700
B	A	9	4	800
C	A	5	5	250
D	A	4	5	100
E	B, C	4	6	300
F	B	11	3	400
G	E	2	5	400
H	B, D	5	6	150
I	F, G	5	2	200
J	F, G	8	6	300
K	H, I	2	2	400

(a) Create an Arrow Diagram. Make sure your arrow diagram reflects the task summary below! I did it with 2 dummies activity and 9 nodes. Appropriately record the results of forward and backward passes on the arrow diagram. Identify the critical path appropriately. What is the shortest possible completion time without crashing any activities?

(b) Calculate floats for activities D, E & G (i.e., TF, FF, IF, IndF, SF). Show your work! Interpret the Floats for E. Interpretation requires describing the float in terms of preceding AND subsequent activities. Are they assumed to occur as early as possible? As late…?

(c) Create a Modified Bar chart.

(d) Vertical lines are used to represent nodes in Modified Bar Charts and can cross non-critical activities anywhere from their EFT to LFT. Let "i" stand for crossing at EFT, "ii" for crossing at LFT, and "iii" for crossing between EFT and LFT. What is the case for activity C? Activity E? Activity G?

(e) Level the number of bulldozers such that no more than 9 or less than 8 are needed during any day, except the last three. Show the results on the Modified Bar chart, as we did in class. I did this by shifting 3 activities. Make sure you understand how the vertical lines can be used to determine Free and Total Float (see previous part).

(f) Going back to the "un-Leveled" project, use project crashing to save as much money as possible by shortening the project. The Indirect Cost of the project is $600/day. Only crash activities by whole-day increments. Assume that Activities E and I can be made no more than 2 days shorter by crashing. Other activities cannot be crashed to less than half their original durations. Activities are crashed until another activity becomes critical, then you have to decide if it is worth it to crash both simultaneously. How long is the project once it has been crashed? How much money was saved by crashing? What activities were crashed? How much was each crashed?