

**Tufts University**  
**Department of Mathematics**  
**Math 50 Homework 4**

**Due: Thursday, November 3, at 1:30 p.m. (in class).**

1. (60 points) A list of tasks, dependencies, and required time (in days) for a small project is as follows:

Task	Depends on	Time Required (days)
A	-	3
B	A	6
C	A	8
D	A	10
E	B,C	5
F	E	7
G	D,E	12
H	E	17
I	D,H	3
J	F,G	4
K	I,J	9

- (a) Draw the precedence network for this project, identifying the earliest and latest possible start dates for each task in order for the project to finish in the minimal total time possible.
- (b) Draw the Gantt chart for this project, indicating the free floats and total floats for each activity. Identify the critical path.
- (c) For each of the following scenarios, say whether or not it will delay or speed up total project completion and, if so, by how long.
- i. Activity B taking 8 days instead of 2.
  - ii. Activity D taking 15 days instead of 10.
  - iii. Activity H taking only 7 days instead of 17.
  - iv. Activity J taking 6 days instead of 4.
2. (40 points) Below is a list of potential tasks in the construction of a highway interchange. Clearly state a reasonable conjecture about the set of precedence relations between the tasks and draw the precedence network for your list of tasks. (Aside from the obvious (e.g., you cannot construct Abutment A before you have built its footings), you will not be graded on your chosen set of precedences, just on the accuracy with which the resulting network matches the precedence table that you give.)
- Set up traffic detour
  - Order and deliver piles
  - Excavate for Abutment A
  - Excavate for Abutment B
  - Drive piles for Abutment A
  - Move pile-driving equipment from Abutment A to Abutment B

- Drive piles for Abutment B
- Construct footings for Abutment A
- Construct footings for Abutment B
- Construct Abutment A
- Construct Abutment B
- Place backfill for Abutment A
- Place backfill for Abutment B
- Construct bridge deck
- Fabricate structural steel
- Erect structural steel
- Place backfill for approaches
- Order and deliver bridge railings
- Order and deliver guard rail
- Erect bridge railings
- Erect guard rail
- Construct concrete curb and gutter
- Set up paving train
- Pave approach roadways
- Delay seeding of slopes until April 1
- Seed and sod approach slopes
- Final inspection