

# GAMS 1

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1. You are in charge of a somewhat complex construction project, that can be divided into small tasks. Each task has a required length of time to complete, and a list of predecessor tasks that must be completed before the task can begin. The list of tasks is summarized in the following table:

Name	ID	DaysRequired	Predecessors
Foundation	FD	8	
ConcreteSlabs	CS	5	FD
FirstBearingWalls	B1	3	CS
FirstInternalWalls	I1	4	CS
FirstFinishing	F1	12	B1,I1,FL2
SecondFloor	FL2	3	B1
SecondBearingWalls	B2	4	FL2
SecondInternalWalls	I2	5	FL2
SecondFinishing	F2	10	B2,I2,RF
Roof	RF	2	B2

For the following questions, formulate the problem as a shortest path problem. Be sure to describe what are the nodes in your graph, what are the edges, how you compute the edge costs, and what are the start and end nodes for your shortest path problem. In addition, obtain a solution for this problem using any programming language (e.g. Python) to read-in the problem data, construct the graph, output csv files for GAMS, and then use GAMS to solve the problem.

The questions are:

- (a) What is the shortest completion time for the project? What is a sequence of project tasks that stop us from completing the project faster? This sequence of tasks is called the “critical path.”
- (b) Can the project be completed within 35 days? If the project can be completed in 35 days, for each task, what is the latest start time for the task that would not delay the project completion? If the project cannot be completed within 35 days, what is a sequence of tasks that make us unable to complete it that quickly?

Turn in these three things:

- (a) A print out of the initial problem data csv file.
- (b) A print out of the program you used to construct the GAMS csv files.
- (c) A print out of the GAMS code you used to solve the problem. Remember that you can use the solution for the GAMS Prep homework as a starting point. Please highlight or underline the lines of code you had to edit. Also, please provide a printout of the output your GAMS program produces that tells you the solution of the problem.