Lesson 7/8. Practice Problem

1 Solve the following problems.

1.1 Problem:

The Supe has asked you to dissiminate a vital piece of information to midshipman Beltran. Here's the catch, though. You don't know midshipman Beltran and you cannot use any technology to contact her. You are only able to transmit this information by telling other midshipmen who can relay the information to other midshipmen until MIDN Beltran receives the information. Consider the table below of midshipmen, including yourself. In this table, there exists a 1 in cell (i, j) if midshipman i knows midshipman j. You can assume, then, if MIDN i knows MIDN j, then MIDN j also knows MIDN i. Also, a MIDN can only pass along the message if they know the other midshipman. Finally, the supe wants to minimize the number of midshipmen who know this information.

	You	Bayless	Poltrack	Foster	Beltran
You	–	1	1	0	0
MIDN Bayless	1	–	1	0	0
MIDN Poltrack	1	1	–	1	0
MIDN Foster	0	0	1	–	1
MIDN Beltran	0	0	0	1	–

1.1.1 Draw a network diagram depicting this problem.

1.1.2 Formulate the concrete mathematical programming model to minimize the number of midshipmen who know the information while also ensuring that MIDN Beltran receives it. To write out the concrete model, clearly describe, in words, all constraints, decision variables, and the objective.

1.2 Exercise 12.1

–Use the Bellman-Ford Algorithm to solve the shortest-path problem for the network.