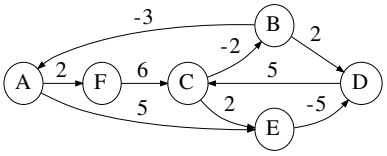
1. Write your name below:

2. (4 pts.) Is the following a valid *predecessor matrix* for a graph with vertices $\{1, 2, 3, 4\}$. (where $\perp$ denotes NIL)? If so, depict the shortest-paths tree it encodes for source vertex 3; otherwise, explain clearly why it is not valid.

$$\begin{pmatrix} \perp & 3 & 4 & 1 \\ 2 & \perp & 2 & 3 \\ 2 & 3 & \perp & 2 \\ 4 & 4 & 1 & \perp \end{pmatrix}$$

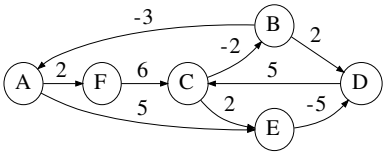
3. Provide the adjacency matrix of the directed graph depicted below, indexing the vertices in alphabetical order.



4. Depict the output of EXTEND-SHORTEST-PATHS($L^{(0)}$,W, $L^{(1)}$,n) (p. 650 of the textbook), where W is the matrix of Question 3 with n set appropriately.

5. Trace the execution of the textbook's SLOW-APSP algorithm (p. 652) on the graph of Question 3, using Fig. 23.1 (p. 652) as a model.

6. Repeat Question 5 using the textbook's FASTER-APSP algorithm (p. 653).



7. Repeat Question 5 with the textbook's FLOYD-WARSHALL algorithm (p. 657), using Figure 23.4 (p. 658) as a model.