

Lab 7 Assignment

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The goal of this assignment is to generalize your solution to lab 7. We restrict ourselves to graphs on 5 vertices, labeled x_1, x_2, x_3, x_4, x_5 . We form a directed graph on x_1, x_2, x_3, x_4, x_5 by having all possible edges $x_i x_j$.

Make an .m file that takes as an input a 5 length vector V and an upper triangular $1, 0, -1$ valued 5×5 matrix B .

- The i th entry of V is the flow into vertex x_i (if negative, then the flow is out of x_i).
- In B , For $i < j$ the ij entry will be 1 if the flow is from x_i to x_j , 0 if there is no flow from x_i to x_j , and -1 if the flow is from x_j to x_i ; 0 otherwise.

For the following four inputs draw out the labeled digraph (no submission, just for your visualization). Then, make an augmented matrix C with the i th row corresponding to the flow through vertex i . Then,

- If C is inconsistent, output saying that no such solution exists.
- If C is consistent, calculate X_p and X_S (you may want to count the number of all 0 rows).

Examples to try:

- (1) $V = [1, 2, -3, 4, -5]$, $B = [0, 1, 1, 1, 1; 0, 0, 1, 1, 1; 0, 0, 0, 1, 1; 0, 0, 0, 0, 1; 0, 0, 0, 0, 0]$
- (2) $V = [50, -35, -25, 40, -30]$, $B = [0, -1, 0, 0, 1; 0, 0, -1, 0, 0; 0, 0, 0, -1, 0; 0, 0, 0, 0, -1; 0, 0, 0, 0, 0]$
- (3) $V = [50, 50, -60, -40, 0]$, $B = [0, 1, 0, 1, 1; 0, 0, 1, 0, 1; 0, 0, 0, -1, -1; 0, 0, 0, 0, -1; 0, 0, 0, 0, 0]$

Submit a .m file and a diary .txt file showing the workings of your code.