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--- Lab Assignment 7 Luis Kligman ---

```
clear all;
close all;
clc;
```

```
% Example 1:
```

```
V1 = [1, 2,-3, 4,-5];
```

```
B1 = [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];
```

```
% Example 2:
```

```
V2 = [50,-35,-25, 40,-30];
```

```
B2 = [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];
```

```
% Example 3:
```

```
V3 = [50, 50,-60,-40, 0];
```

```
B3 = [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];
```

```
n = length(V3);
```

--- Identify all directed edges from B ---

```
edges = []; % each row [i j] means flow variable from xi to xj
for i = 1:n
    for j = i+1:n
        if B3(i,j) ~= 0
            edges = [edges; i j];
        end
    end
end
```

```

        end
    end
end

m = size(edges,1); % number of edges (columns)
C = zeros(n,m);

```

--- Build flow coefficient matrix ---

```

for k = 1:m
    i = edges(k,1);
    j = edges(k,2);
    if B3(i,j) == 1 % flow i → j
        C(i,k) = -1; % out of i
        C(j,k) = 1; % into j
    elseif B3(i,j) == -1 % flow j → i
        C(i,k) = 1; % into i
        C(j,k) = -1; % out of j
    end
end
end

```

--- Augment with V ---

```
Aug = [C V3'];
```

--- Solve System ---

```

rrefC = rref(Aug);
if rank(C) < rank(Aug)
    disp('No Solution Exists');
else
    X_p = C\V3'; % Particular Solution
    X_s = null(C, 'r'); % Special Solution Space
    disp('Particular Solution Xp:');
    disp(X_p);
    disp('Special Solution Basis Xs:');
    disp(X_s);
end

```

Warning: Rank deficient, rank = 4, tol = 2.512148e-15.

Particular Solution Xp:

```

50.0000
-100.0000
-0.0000
0
0
-60.0000
0
0

```

Special Solution Basis Xs:

```

1 -1 -1 0

```

0	1	0	-1
-1	0	1	1
0	-1	-1	0
1	0	0	0
0	1	0	0
0	0	1	0
0	0	0	1

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