```
% Assignment 3 - Question 2
clear
% Disclaimer - I have changed the order of the elements and renamed them in
% anti-clockwise order in order to use the regular convention.

%% defining Domain & Grid

points = [0 3 3 0;-1 -1 1 1];

x_div = 21;
y_div = 21;

x_val = linspace(0,3,x_div);
y_val = linspace(-1,1,y_div);

[X,Y] = meshgrid(x_val,y_val);

%% Calculating the interpolated Values

Ae = (points(1,2) - points(1,1))*(points(2,3) - points(2,2));
tot_disp = zeros(x_div*y_div,1);

u_inter = zeros(size(X));
v_inter = zeros(size(X));

node = 0;

for i=1:x_div
    for j = 1:y_div
    node = node +1;
    x = X(j,i);
    y = Y(j,i);
    N1 = (1/Ae) * (x - points(1,2))*(y - points(2,4));
    N2 = -(1/Ae) * (x - points(1,1))*(y - points(2,4));
    N3 = (1/Ae) * (x - points(1,1))*(y - points(2,1));
    N4 = -(1/Ae) * (x - points(1,2))*(y - points(2,1));
    N = [N1 0 N2 0 N3 0 N4 0;0 N1 0 N2 0 N3 0 N4];
    disp_ele = [-5 5 10 10 15 -10 5 0];
    fval = N*disp_ele';
    u_inter(j,i) = fval(1);
    v_inter(j,i) = fval(2);

    tot_disp(node) = sqrt(fval(1)^2 + fval(2)^2);
    end
end

%% Plotting the Contours

quiver(X,Y,u_inter,v_inter)
```

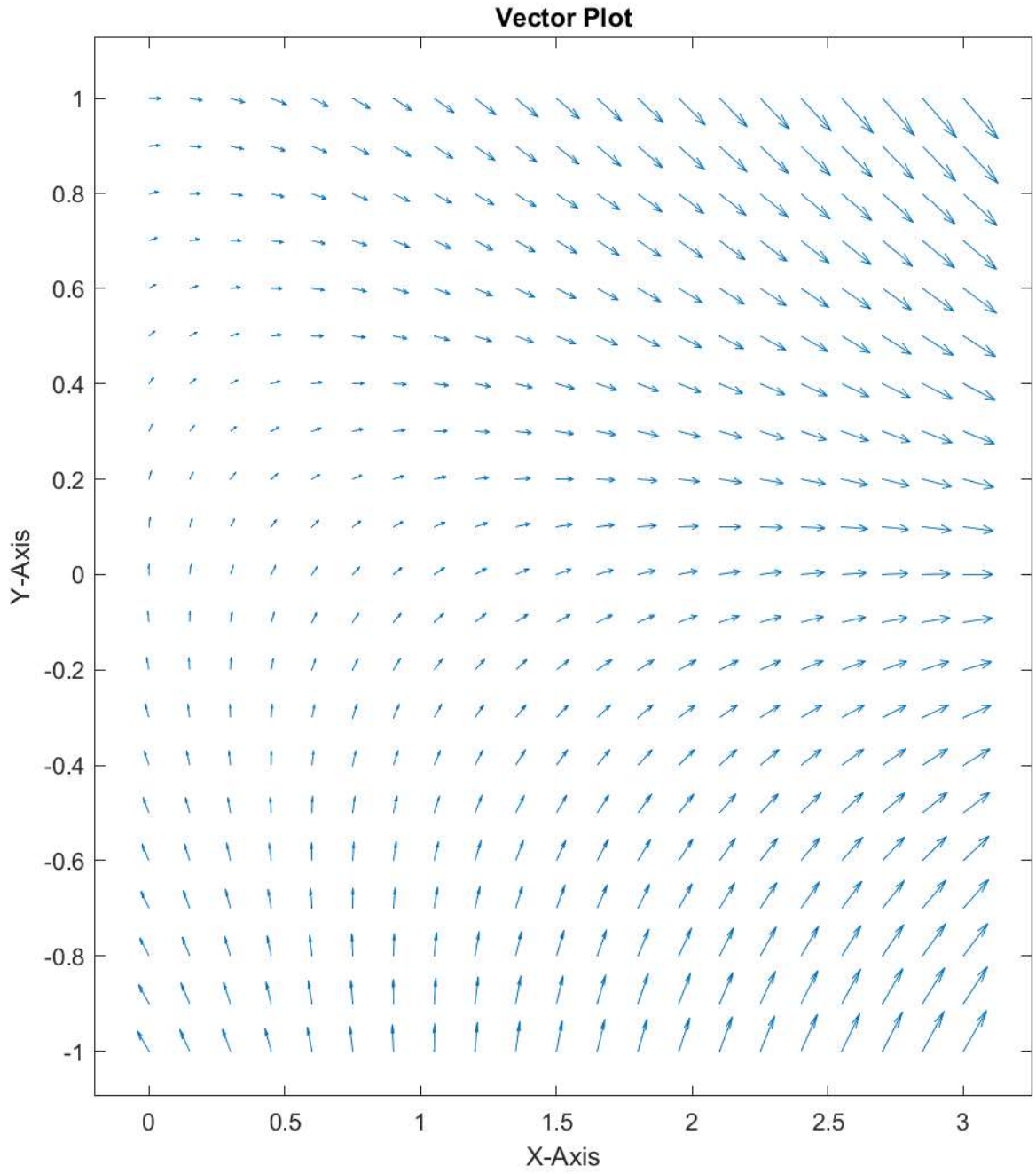
```
xlabel('X-Axis')
ylabel('Y-Axis')
title('Vector Plot')

% Components of Displacement at the Center of the Element

x_displacement = u_inter(11,11)
y_displacement = v_inter(11,11)

% which are equivallent to
% X-Component - 6.2500
% Y-Component - 1.2500

% Total Displacement Calculated Nodewise(Anticlockwise) in tot_disp array.
```


Vector Plot
Y-Axis
X-Axis
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
0
0.5
1
1.5
2
2.5
3