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```
% 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));

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

for i=1:x_div
    for j = 1:y_div

    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);
    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)

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

z_inter = sqrt(u_inter.^2 + v_inter.^2)
```

```
x_displacement =

    6.2500


y_displacement =

    1.2500


z_inter =

  Columns 1 through 7

    7.0711    6.7546    6.5192    6.3738    6.3246    6.3738    6.5192
    6.5431    6.2276    5.9943    5.8530    5.8106    5.8690    6.0255
    6.0208    5.7080    5.4795    5.3461    5.3151    5.3881    5.5610
    5.5057    5.1981    4.9781    4.8575    4.8438    4.9379    5.1338
    5.0000    4.7011    4.4944    4.3932    4.4045    4.5277    4.7539
    4.5069    4.2214    4.0350    3.9617    4.0078    4.1693    4.4335
    4.0311    3.7658    3.6090    3.5751    3.6674    3.8770    4.1863
    3.5795    3.3441    3.2297    3.2493    3.4004    3.6668    4.0257
    3.1623    2.9707    2.9155    3.0042    3.2249    3.5532    3.9623
    2.7951    2.6660    2.6891    2.8606    3.1563    3.5455    4.0008
    2.5000    2.4559    2.5739    2.8339    3.2016    3.6443    4.1382
    2.3049    2.3654    2.5848    2.9275    3.3560    3.8416    4.3653
    2.2361    2.4083    2.7203    3.1305    3.6056    4.1231    4.6690
    2.3049    2.5779    2.9633    3.4235    3.9322    4.4730    5.0355
    2.5000    2.8515    3.2901    3.7857    4.3186    4.8766    5.4521
    2.7951    3.2028    3.6785    4.1991    4.7500    5.3217    5.9082
    3.1623    3.6090    4.1110    4.6503    5.2154    5.7987    6.3953
    3.5795    4.0537    4.5751    5.1291    5.7064    6.3004    6.9070
    4.0311    4.5256    5.0621    5.6286    6.2169    6.8214    7.4381
    4.5069    5.0170    5.5661    6.1437    6.7426    7.3575    7.9848
    5.0000    5.5227    6.0828    6.6708    7.2801    7.9057    8.5440
```

```
  Columns 8 through 14

    6.7546    7.0711    7.4582    7.9057    8.4039    8.9443    9.5197
    6.2726    6.6002    6.9970    7.4519    7.9550    8.4978    9.0731
    5.8251    6.1685    6.5788    7.0445    7.5552    8.1025    8.6794
    5.4206    5.7847    6.2125    6.6919    7.2125    7.7661    8.3461
    5.0695    5.4589    5.9076    6.4031    6.9354    7.4967    8.0808
    4.7836    5.2022    5.6741    6.1872    6.7320    7.3015    7.8904
    4.5751    5.0249    5.5210    6.0519    6.6092    7.1868    7.7802
    4.4548    4.9358    5.4551    6.0026    6.5714    7.1563    7.7537
    4.4300    4.9396    5.4795    6.0415    6.6200    7.2111    7.8118
    4.5023    5.0361    5.5931    6.1669    6.7534    7.3493    7.9527
    4.6670    5.2202    5.7906    6.3738    6.9664    7.5664    8.1720
    4.9151    5.4829    6.0639    6.6544    7.2523    7.8557    8.4636
    5.2345    5.8138    6.4031    7.0000    7.6026    8.2098    8.8204
    5.6132    6.2018    6.7986    7.4014    8.0091    8.6205    9.2349
    6.0400    6.6370    7.2409    7.8502    8.4635    9.0802    9.6995
    6.5054    7.1107    7.7222    8.3385    8.9587    9.5819   10.2076
    7.0018    7.6158    8.2356    8.8600    9.4882   10.1193   10.7529
    7.5230    8.1463    8.7754    9.4091   10.0465   10.6870   11.3301
    8.0642    8.6977    9.3371    9.9812   10.6293   11.2805   11.9345
    8.6216    9.2662    9.9169   10.5727   11.2326   11.8959   12.5622
    9.1924    9.8489   10.5119   11.1803   11.8533   12.5300   13.2098

  Columns 15 through 21

   10.1242   10.7529   11.4018   12.0675   12.7475   13.4397   14.1421
    9.6750   10.2990   10.9413   11.5988   12.2691   12.9502   13.6405
    9.2804    9.9011   10.5380   11.1884   11.8501   12.5212   13.2004
    8.9474    9.5660   10.1987   10.8430   11.4970   12.1592   12.8282
    8.6833    9.3005    9.9298   10.5688   11.2161   11.8701   12.5300
    8.4945    9.1109    9.7372   10.3716   11.0128   11.6596   12.3111
    8.3860    9.0017    9.6255   10.2558   10.8915   11.5317   12.1758
    8.3610    8.9761    9.5975   10.2241   10.8550   11.4895   12.1269
    8.4202    9.0347    9.6540   10.2774   10.9041   11.5336   12.1655
    8.5619    9.1758    9.7935   10.4143   11.0377   11.6633   12.2907
    8.7821    9.3958   10.0125   10.6316   11.2528   11.8757   12.5000
    9.0750    9.6893   10.3059   10.9245   11.5447   12.1664   12.7892
    9.4340   10.0499   10.6677   11.2872   11.9080   12.5300   13.1529
    9.8517   10.4706   11.0911   11.7130   12.3362   12.9603   13.5854
   10.3211   10.9445   11.5694   12.1955   12.8228   13.4511   14.0801
   10.8354   11.4650   12.0960   12.7282   13.3616   13.9958   14.6309
   11.3886   12.0260   12.6649   13.3051   13.9463   14.5885   15.2315
   11.9752   12.6222   13.2707   13.9206   14.5716   15.2236   15.8765
   12.5907   13.2488   13.9086   14.5699   15.2324   15.8960   16.5605
   13.2309   13.9017   14.5744   15.2486   15.9242   16.6011   17.2790
   13.8924   14.5774   15.2643   15.9531   16.6433   17.3349   18.0278
```

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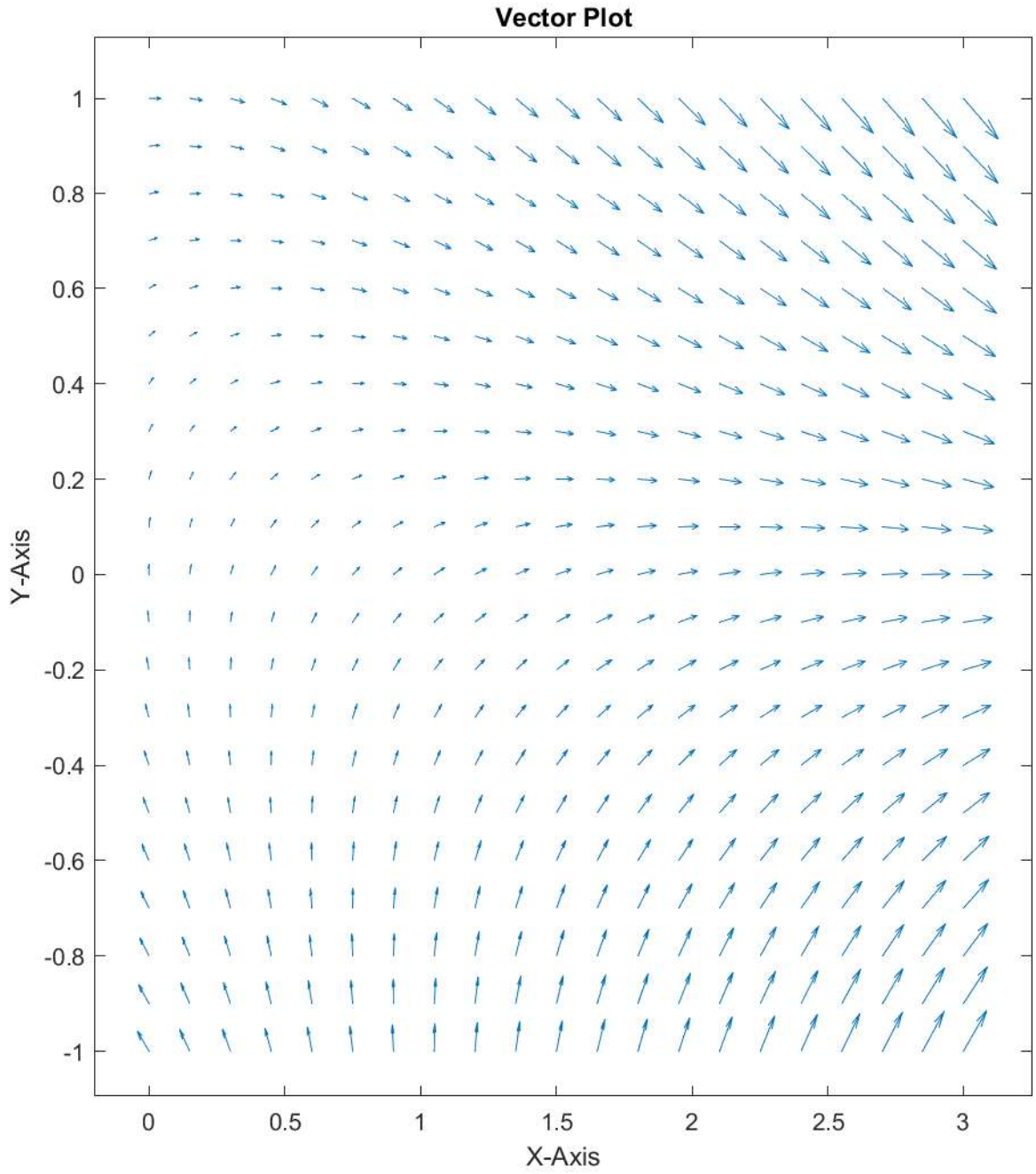
Vector Plot
Y-Axis
X-Axis
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0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
0
0.5
1
1.5
2
2.5
3