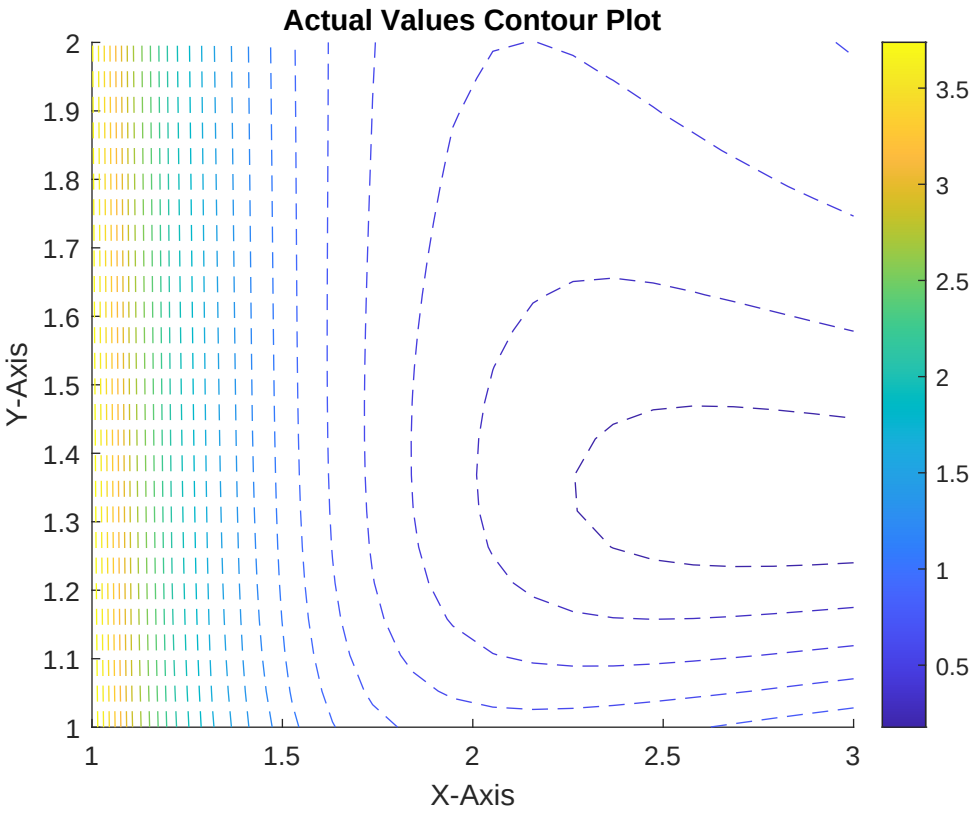
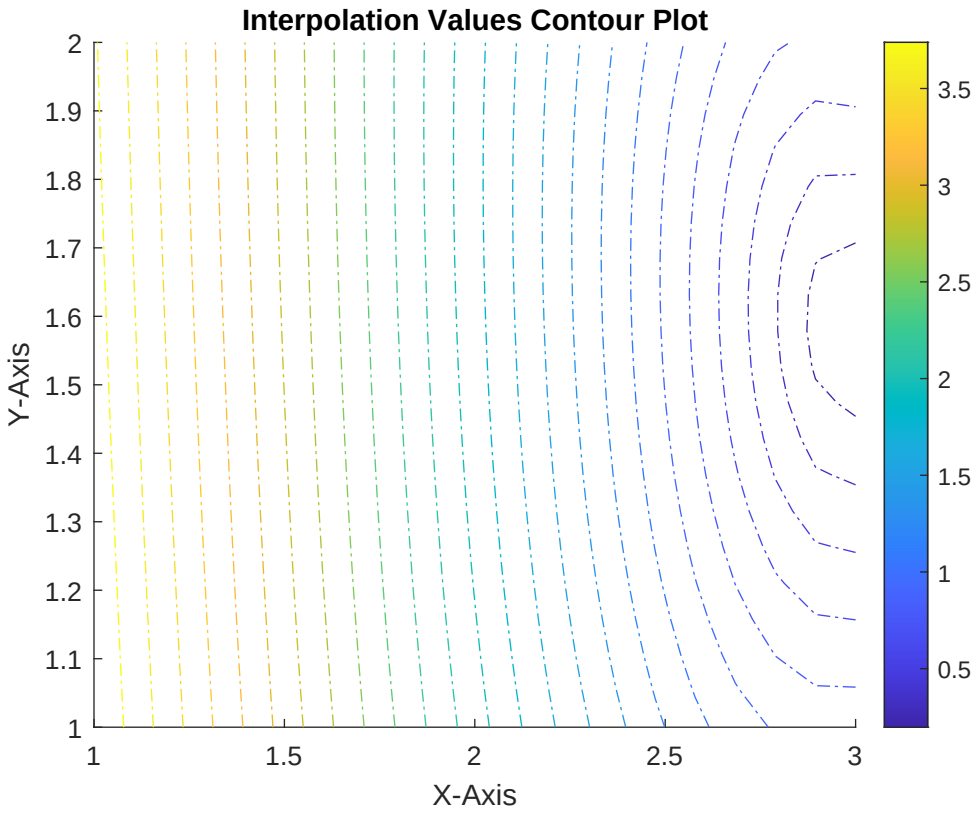
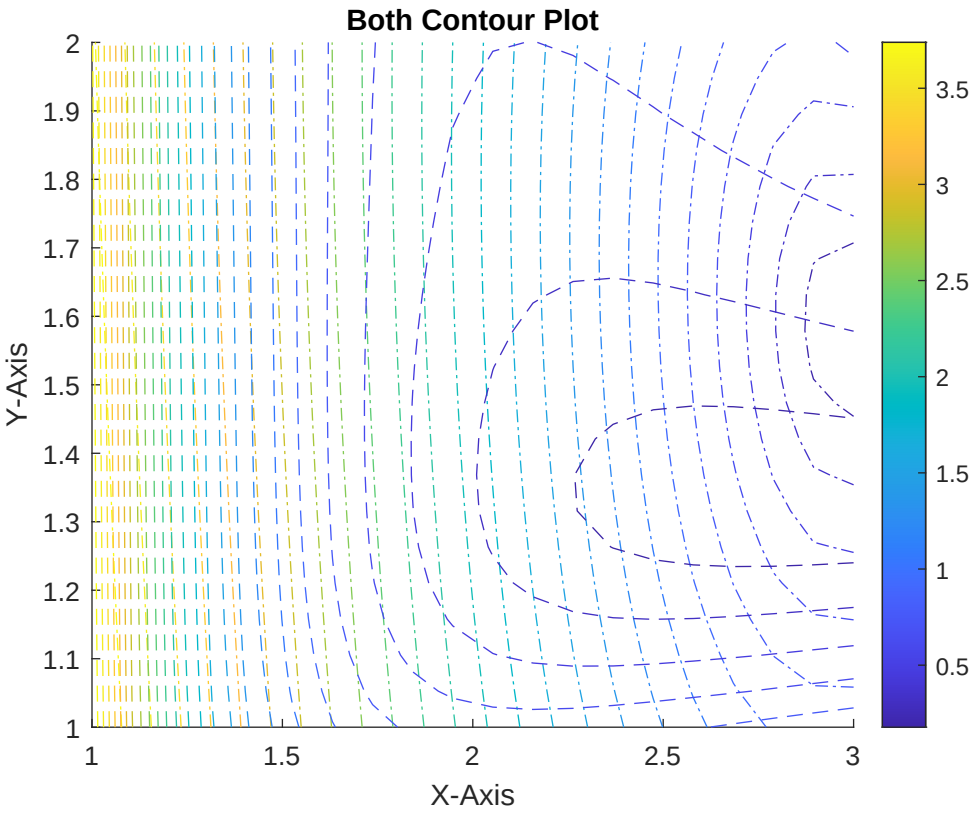

Actual Values Contour Plot
Y-Axis
X-Axis
2
1.9
1.8
1.7
1.6
1.5
1.4
1.3
1.2
1.1
1
1
1.5
2
2.5
3
3.5
3
2.5
2
1.5
1
0.5


Interpolation Values Contour Plot
Y-Axis
X-Axis
2
1.9
1.8
1.7
1.6
1.5
1.4
1.3
1.2
1.1
1
1
1.5
2
2.5
3
3.5
3
2.5
2
1.5
1
0.5


Both Contour Plot
Y-Axis
X-Axis
2
1.9
1.8
1.7
1.6
1.5
1.4
1.3
1.2
1.1
1
1
1.5
2
2.5
3
3.5
3
2.5
2
1.5
1
0.5

There are three contours included. After seeing the individual contours, the individual contours in the final plot can be easily differentiated.
It can be clearly seen that the contour values match closely at the left end, where both the contour plots are yellow.
Here, the interpolation are most accurate. The accuracy keeps decreasing as me move right, with least accurate on the right side.
This is not a good interpolation. The value difference is in the order of the actual values and thus, the interpolation can not be accepted.

```
%% Assignment 2
clear

%% defining Domain & Grid

points = [1,3,3,1;1 1 2 2];

x_div = 20;
y_div = 20;

x_val = linspace(1,3,x_div);
y_val = linspace(1,2,y_div);

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

%% Calculating Actual Values

ux_act = (3/8)*X - (2/3)*(X./Y.^2);
uy_act = 4./X.^3 - Y/8;

z_act = sqrt(ux_act.^2 + uy_act.^2);

%% Calculating the interpolated Values

Ae = (points(1,2) - points(1,1))*(points(2,3) - points(2,2));

u_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 = [ux_act(1,1) uy_act(1,1) ux_act(1,x_div) uy_act(1,x_div)
ux_act(y_div,x_div) uy_act(y_div, x_div) ux_act(y_div,1) uy_act(y_div,1)];
    fval = N*disp_ele';
    z_inter = sqrt(fval(1).^2 + fval(2).^2);
    u_inter(j,i) = z_inter;
    end
end

%% Plotting the Contours

hold on;
contour(X,Y,u_inter,25,'-.')
contour(X,Y,z_act,25,'--')
hold off
```

```
colorbar()
xlabel('X-Axis')
ylabel('Y-Axis')
title('Both Contour Plot')
```