```
#Q2 Code
% Assignment 7 Q2

x_domain = 0:0.01:3;
y_domain = 0:0.01:2;



z_x = zeros(length(y_domain),length(x_domain));
z_y = zeros(length(y_domain),length(x_domain));

for i = 1:length(y_domain)
    for j = 1:length(x_domain)
        z = inst_disp(x_domain(j),y_domain(i));
        z_x(i,j) = z(1);
        z_y(i,j) = z(2);
    end
end


[X,Y] = meshgrid(x_domain,y_domain);
Z = sqrt(z_x.^2 + z_y.^2);
contourf(X,Y,Z,10,'-.','ShowText','on')
xlabel('X-Axis')
ylabel('Y-Axis')
colorbar

total_A = 0.5*det(transpose([1 1 1;nodes]));
H = (0.5/total_A)*[nodes(2,2)-nodes(2,3) 0 nodes(2,3)-nodes(2,1) 0 nodes(2,1)-nodes(2,2)
0; 0 nodes(1,3)-nodes(1,2) 0 nodes(1,1)-nodes(1,3) 0 nodes(1,2)-nodes(1,1); nodes(1,3)-
nodes(1,2) nodes(2,2)-nodes(2,3) nodes(1,1)-nodes(1,3) nodes(2,3)-nodes(2,1) nodes(1,2)-
nodes(1,1) nodes(2,1)-nodes(2,2)];
node_disp = transpose([disps(1,1) disps(2,1) disps(1,2) disps(2,2) disps(1,3)
disps(2,3)]);
ele_strain = H*node_disp


function ele_disp = inst_disp(x,y)

        nodes = [2 3 0;0 2 1];
        disps = [0 0.1 -0.1;0.1 0.2 0.15];

        A = 0.5*det(transpose([1 1 1;nodes]));

        N1 = (0.5/A)*det(transpose([1 1 1;x nodes(1,2:3);y nodes(2,2:3)]));
        N2 = (0.5/A)*det(transpose([1 1 1;nodes(1,1) x nodes(1,3);nodes(2,1) y
nodes(2,3)]));
        N3 = (0.5/A)*det(transpose([1 1 1;nodes(1,1:2) x;nodes(2,1:2) y]));

        N = [N1 0 N2 0 N3 0;0 N1 0 N2 0 N3];
        d = transpose([disps(1,1) disps(2,1) disps(1,2) disps(2,2) disps(1,3)
disps(2,3)]);

        if N1 >=0 && N2 >=0 && N3 >=0
            ele_disp = N*d;
        else
            ele_disp = [NaN NaN];
        end
end

--------------------------------------------------------------------------------

Element Strain Output

    0.0600
    0.0500
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0.0200
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