Assignment 8
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Question 2

```
>> q2

K =

   1.0e+10 *

    5.2045    2.5356   -2.0316   -0.4258   -3.1203   -2.0272   -0.0526   -0.0827
    2.5356    6.6383   -0.4258    0.5615   -2.0272   -4.1214   -0.0827   -3.0784
   -2.0316   -0.4258    2.5866   -0.6370    0.1869   -0.0242   -0.7419    1.0870
   -0.4258    0.5615   -0.6370    2.7697   -0.0242   -2.7891    1.0870   -0.5421
   -3.1203   -2.0272    0.1869   -0.0242    4.8931    2.4596   -1.9597   -0.4082
   -2.0272   -4.1214   -0.0242   -2.7891    2.4596    6.2623   -0.4082    0.6483
   -0.0526   -0.0827   -0.7419    1.0870   -1.9597   -0.4082    2.7543   -0.5960
   -0.0827   -3.0784    1.0870   -0.5421   -0.4082    0.6483   -0.5960    2.9723
```

Code:

```
CordMat=[0.4 1.4 1.1 0.1; 0.5 0.3 1.2 1.3];
E=7*10^10;
v=0.25;

syms zeta eta

%Plain Strain
m=E/((1+v)*(1-(2*v)));
D= m.*[1-v v 0 ; v 1-v 0; 0 0 (1-(2*v))/2];

%Shape Functions
N1= (0.25)*(1-zeta)*(1-eta);
N2=(0.25)*(1+zeta)*(1-eta);
N3= (0.25)*(1+zeta)*(1+eta);
N4= (0.25)*(1-zeta)*(1+eta);

J = 0.25*[eta-1 1-eta 1+eta -1-eta; zeta-1 -1-zeta 1+zeta 1-zeta]*[transpose(CordMat)];

Hstar= inv(J)*[diff(N1,zeta) diff(N2,zeta) diff(N3,zeta) diff(N4,zeta); diff(N1,eta) diff(N2,eta) diff(N3,eta) diff(N4,eta)];

H= [Hstar(1,1) 0 Hstar(1,2) 0 Hstar(1,3) 0 Hstar(1,4) 0; 0 Hstar(2,1) 0 Hstar(2,2) 0 Hstar(2,3) 0 Hstar(2,4); Hstar(2,1) Hstar(1,1) Hstar(2,2) Hstar(1,2) Hstar(2,3) Hstar(1,3) Hstar(2,4) Hstar(1,4)];

Kstar= transpose(H)*D*H;

gp = [-0.577 0.577];
weight = [1 1];

fin_K = zeros(size(Kstar));
for i =1:length(gp)
    for j = 1:length(gp)
        zeta = gp(i);
        wt_z = weight(i);

        eta = gp(j);
        wt_e = weight(j);

        fin_K = fin_K + wt_z*wt_e*subs(Kstar*det(J));
    end
end

K = double(fin_K)
```