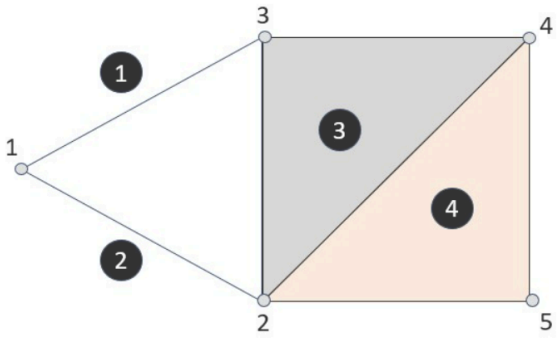
Prob 1: Assembly of stiffness matrix

1 solution submitted (max: 3) | View my solutions

Consider the mesh shown below. The mesh consists of 4 elements --- 2 truss elements and 2 triangular elements. The triangular elements have 3 nodes each with two dof's per node. The truss elements have 2 nodes per element and 2 dof's per node. The dof's are x and y translations. The local stiffness matrices for all the four elements are given in the problem as `K1,K2,K3,K4`. You need to create the destination array and assemble the global stiffness. You will be marked on the basis of the destination arrays and the assembled stiffness matrix `Kglobal`. For the truss elements 1 and 2, local node numbers 1 and 2 correspond to (1,3) and (1,2) respectively. For the triangular elements 3 and 4, local node numbers 1,2,3, correspond to (2,4,3) and (2,5,4) respectively.




```
% problem 2a: assembling elements with different number of nodes per
% element
Kglobal=zeros(10,10);
nelem=4; %number of elements
nnode=10; %number of nodes
% for element 1 and 2
k=3.15e04;
%for element 1
theta=pi/4;
c=cos(theta);s=sin(theta);
K1=k*[c*c c*s -c*c -c*s;c*s s*s -c*s -s*s;c*s s*s c*c c*s;-c*s -s*s c*s
s*s];
dest1=[1 2 5 6];
%for element 2
theta=-pi/4;
c=cos(theta);s=sin(theta);
K2=k*[c*c c*s -c*c -c*s;c*s s*s -c*s -s*s;c*s s*s c*c c*s;-c*s -s*s c*s
s*s];
dest2=[1 2 3 4];
% for element 3
K3 = 37500*[140 0 0 -70 -140 70;0 400 -60 0 60 -400;0 -60 100 0 -100
60;-70 0 0 35 70 -35;...
   -140 60 -100 70 240 -130;70 -400 60 -35 -130 435];
dest3=[3 4 7 8 5 6];
```

```
%for element 4
K4 = 37500*[100 0 -100 60 0 -60;0 35 70 -35 -70 0;-100 70 240 -130 -140
60;...
   60 -35 -130 435 70 -400;0 -70 -140 70 140 0;-60 0 60 -400 0 400];
dest4=[3 4 9 10 7 8];
for ii=1:nelem
   if ii == 1
       Klocal=K1;
       dest=dest1;
   end
   if ii == 2
       Klocal=K2;
       dest=dest2;
   end
   if ii == 3
       Klocal=K3;
       dest=dest3;
   end
   if ii== 4
       Klocal=K4;
       dest=dest4;
   end
% assemble Kglobal here
c=dest;
l=Klocal;
Kglobal(c,c)=Kglobal(c,c)+l;
end
Kglobal
```