

Homework Exercises for Chapter 4 Analysis of Example Truss by a CAS – Solutions

EXERCISE 4.1 Not assigned.

EXERCISE 4.2 Not assigned.

EXERCISE 4.3 Not assigned.

EXERCISE 4.4

ElemStiff2DTwoNodeBar	Usable for any plane truss but not other elements
MergeElemIntoMasterStiff	Usable for any plane truss but not other elements
AssembleMasterStiffOfExampleTruss	Usable for example truss only
ModifiedMasterStiffForDBC	Usable for any structure
ModifiedMasterForcesForDBC	Usable for any structure
IntForce2DTwoNodeTruss	Usable for any plane truss but not other elements
IntForcesOfExampleTruss	Usable for example truss only

EXERCISE 4.5 Cells 3, 6 and 7 are modified as shown in Figure E4.2 below. The other cells can be kept untouched.

Cell 3: module to assemble master stiffness matrix of truss of Exercise 3.6
<pre>AssembleMasterStiffOfExampleTruss[]:= Module[{Ke,K=Table[0,{6},{6}]}, Ke=ElemStiff2DTwoNodeBar[{{-4,0},{0,3}},{1000,2}]; K= MergeElemIntoMasterStiff[Ke,{1,2,3,4},K]; Ke=ElemStiff2DTwoNodeBar[{{ 0,3},{4,0}},{1000,4}]; K= MergeElemIntoMasterStiff[Ke,{3,4,5,6},K]; Return[K]];</pre>
Cell 6: module to get internal forces in members of truss of Exercise 3.6
<pre>IntForcesOfExampleTruss[u_]:= Module[{f=Table[0,{2}]}], f[[1]]=IntForce2DTwoNodeBar[{{-4,0},{0,3}},{1000,2},{1,2,3,4},u]; f[[2]]=IntForce2DTwoNodeBar[{{ 0,3},{4,0}},{1000,4},{3,4,5,6},u]; Return[f]];</pre>
Cell 7: driver program to analyze truss of Exercise 3.6
<pre>f={0,0,12,0,0,0}; K=AssembleMasterStiffOfExampleTruss[]; Kmod=ModifiedMasterStiffForDBC[{1,2,5,6},K]; fmod=ModifiedMasterForcesForDBC[{1,2,5,6},f]; u=Simplify[Inverse[Kmod].fmod]; Print["Computed nodal displacements:"]; Print[u]; f=Simplify[K.u]; Print["External node forces including reactions:"]; Print[f]; p=Simplify[IntForcesOfExampleTruss[u]]; Print["Internal member forces:"]; Print[p];</pre>
<pre>Computed nodal displacements: {0, 0, $\frac{9}{512}$, $\frac{1}{128}$, 0, 0} External node forces including reactions: {-6, $-\frac{9}{2}$, 12, 0, -6, $\frac{9}{2}$} Internal member forces: {$\frac{15}{2}$, $-\frac{15}{2}$}</pre>

FIGURE E4.2. Modified cells to do the truss of Exercise 3.6.

EXERCISE 4.6 Not assigned.

EXERCISE 4.7 Not assigned.