

CIE 514 – Introduction to Advanced Mathematics and Mechanics  
Assignment #3 – Rubric

2. Listing of modified `simpleFEA` shown highlighting changes needed to build  $B$  matrix (learning objectives 1.1 and 2)
  - a. Input section calls `CreateTetraOctaTruss`
  - b. Assembly section calls a function that constructs  $B$  matrix for a 3D truss member
  - c. Structure  $B$  matrix assembled so that each row corresponds to a member, and each column to a degree of freedom
3. (i) Rank of  $B$  computed correctly (learning objective 1.2)  
(ii) degree of static indeterminacy computed as the dimension of the null space of  $B^T$  (learning objective 1.2)  
(iii) number of mechanisms computed as the dimension of the null space of  $B$  minus the number of rigid body modes (learning objective 1.2)
4. Rigid body modes computed correctly and shown diagrammatically using `drawTetraOctaTruss` (learning objective 2)
5. Internal mechanism computed correctly by orthogonal projection and shown diagrammatically using `drawTetraOctaTruss` (learning objectives 1.3 and 2)
6. Prestress mode computed correctly as the element of a basis for the null space of  $B^T$  (learning objective 1.2)