

MECH151 Spring 2010
Homework #3 due Apr. 20

1. Create function `beam2k` using the template on the class web site. The six element DOF for this element will be $\hat{d}_{1x}, \hat{d}_{1y}, \phi_1, \hat{d}_{2x}, \hat{d}_{2y}, \phi_2$. (Do you see why we don't bother putting a hat on ϕ ?) It will consist of two parts:
 - A 2×2 representing extension (eq. 5.1.5). This sub-matrix, which is identical to the entire truss element stiffness matrix, will be placed in rows and columns 1 and 4 of \hat{k} .
 - A 4×4 representing bending (eq. 4.1.4 – note the typo, coefficient should be EI/L^3 , not EL/L^3). This sub-matrix will be placed in rows & cols [2 3 5 6].

As with the truss element, you will transform \hat{k} to k (global coordinates) using the transformation matrix given in Ch. 5. You will also generate a `dof` list consisting of [3*n1-2 3*n1-1 3*n1 3*n2-2 3*n2-1 3*n2].

2. Use your function to solve problem 5-10. You can use `p3p24.m` from the web site as a template. But you can stop when you get to displacement answers since you don't yet have function `beam2s` for stress calcs. (But if you're feeling ambitious and want to create it, go ahead since we'll need it soon.)