[File upload] <u>ftp://cdl.hanyang.ac.kr</u> → cdl/cdl → 차제구조 → Lab_midterm_exam
[analysis_result_file] (학번)_(문제번호)_(요소종류)
ex) 2000100100_1_beam
[report_file] (학번) upload only one file for all problems.

[1-2] For the alloy steel beam and boundary condition shown, verify the following equations.



The maximum deflection in portion AB: $y_{\text{max}} = 0.0642 \frac{PaL^2}{EI}$

- 1. Use 1-D beam element. (10 pts)
- 2. Use 3-D solid element. (20 pts)

3. Two columns consist of an aluminum tube that has a 32-mm outer diameter and a 4-mm wall thickness. Using E = 70 GPa and v = 0.3, determine the allowable load \mathbf{P}_0 for each support condition shown. Are these critical loads the same? Compare the results between 1-D and 3-D (solid) element. (35 pts)



4. A segment of alloy steel pipe, of which the thickness is 1 mm, is under the inner pressure of 1kN/mm. Determine the nodal displacement at the outer surface of the pipe. [Hint: Use 1/4 symmetric model with shell element] (35 pts)

