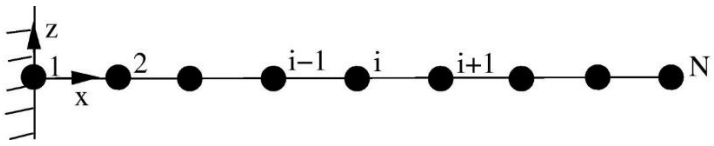
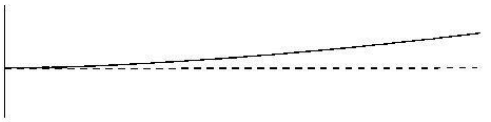
Exercise: Natural vibrations

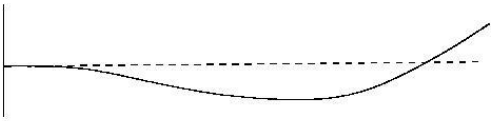
Use your deflection function to construct the flexibility matrix **F** and find the first three modes for the reference DTU 10MW wind turbine blade. Remember that your blade is rigid at node 1, where r=2.8m.



First validate your codes using a simple cantilever beam with constant values of E,I and m to compare with the analytical solution below.



$$\omega_1 = \frac{3.516}{L^2}\left(\frac{EI}{m}\right)^{1/2}$$



$$\omega_2 = \frac{22.03}{L^2}\left(\frac{EI}{m}\right)^{1/2}$$

$$\omega_3 = \frac{61.70}{L^2}\left(\frac{EI}{m}\right)^{1/2}$$