Name_____ Student number_____

Assignment 4

Consider the cantilever on pages 7-10 of the lecture notes. Use the beam model to find the vertical displacement w and axial rotation ϕ of the cantilever at the free end and, thereby, the spring coefficients k_b and k_t of the bending and torsion relationships $F = k_b w$ and $T = k_t \phi$ where F and T are the force and torque resultants of the loading. The cross-sectional properties needed are the second moment of area I with respect to the *area centroid* and polar moment J according to St. Venant's torsion theory. Use the simplified formulas for thin open profiles ($t/a \ll 1$ and $t/b \ll 1$) and for J. First, find the expressions of k_b and k_t in terms of the geometrical and material parameters. After that, calculate the spring coefficients using the values of the parameters given on page 9 of the lecture notes.