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 and axial rotation of the cantilever at the free end and, thereby, the spring coefficients  and  of the bending and torsion relationships  and  where  and  are the force and torque resultants of the loading. The cross-sectional properties needed are the second moment of area with respect to the *area centroid* and polar moment according to St. Venant’s torsion theory. Use the simplified formulas for thin open profiles ( and ) and for . First, find the expressions of  and  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.

*y*

*z*

*w*

*h*

*t*

A.C