Name_____ Student number_____

Assignment 4 (4p)

Consider the curved beam rigidity problem on page 1-4 to 1-8 of the lecture notes. Use the curved beam equations on page 1-6 with hand calculations or Mathematica to find the analytical solution to the vertical displacement v as the function of mass m used as loading. Use the expression to deduce the coefficient a of

$$\frac{mgR^2}{EI} = a\frac{v}{R}.$$

In the expression, g is the acceleration by gravity, R is the radius , I the second moment of cross section with respect to the area centroid, and E is the Young's modulus of the rim material. The specific form above is based on dimension analysis and additional assumptions of linearity and vanishing displacement without external loading.