

Name\_\_\_\_\_ Student number\_\_\_\_\_

### Assignment 3

Consider the disk rigidity problem on page 1-4 of the lecture notes. Simplify the structure by omitting the disk part outside the support. Use literature to find the analytical transverse displacement solution to a circular elastic plate loaded at the center point. Use the expression to deduce the coefficient  $a$  of (predicted by dimension analysis)

$$\frac{mgR^2}{Et^4} = f\left(\frac{u}{t}, \nu\right) = a \frac{u}{t},$$

where  $m$  is the mass used for loading,  $g$  is the acceleration by gravity,  $R$  is the disk radius,  $t$  is the disk thickness,  $E$  is the Young's modulus of the disk material,  $\nu$  its Poisson's ratio, and  $u$  the transverse displacement at the center point. The latter form assumes linearity and vanishing displacement without external loading, i.e.,  $u = 0$  when  $m = 0$ .