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)

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

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, ν 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 $m = 0$.