Assignment 5 (4p)

A long rain gutter of cylindrical shape is filled with water (density ρ) and mounted with long cylindrical joints. Assuming that displacement and stress are independent in the $z-$coordinate, and weight of the gutter is negligible, write down the boundary value problem giving as its solution the stress resultants and displacement components according to Kirchhoff theory. Thickness t, radius R, and the material parameters E, ν are constants. Use the equilibrium and constitutive equations in the cylindrical (z,ϕ,n) coordinate system ($\vec{e}_n$ points inwards).