ME 323: Mechanics of Materials ***Homework Set H16***

Summer 2024 ***Assigned/Due: July 15/July 17***

An open-top, thin-walled tank is half-filled with a liquid with a mass density of ρ. The tank has a wall thickness of t and an inner radius of r (with $t/r = 0.05$) and is made up of a material with a mass density of 10ρ.

a) Determine the hoop stress σ_h and axial stress σ_a in the wall of the tank, each as a function of the height y. What are the maximum values of each and where on the tank does these maxima occur? Leave your answers in terms of, at most, H, ρ and g.

b) Make sketches of σ_h and σ_a vs. y.

c) At what height in the tank wall are the hoop and axial stress components equal to each other?