Problem 276C

A yacht has a length along the waterline of 16.8 m. Assuming a forward speed of 4 m/s, that the underwater surface is hydraulically smooth and that the short laminar portion of the boundary layer at the bow is negligible, find the total skin friction drag on the yacht assuming that the underwater hull surface on one side can be approximated by a plate 1 m wide. Also assume that the density, ρ, and kinematic viscosity, ν, of water are respectively, 10^3 kg/m^3 and 10^{-6} m^2/s.

What would the maximum admissable roughness of the surface be at the mid-length of the yacht in order to ensure a hydraulically smooth surface?