Example

Water flows through a section of 2.54-cm diameter tube 3.0 m long. The water enters the section at 60°C with a velocity of 2 cm/s. Assuming that the flow is **fully developed** (buzza buzza buzz) by the time it enters the region of interest and that the wall is subject to constant wall heat flux,

(a) calculate the wall heat flux (in W/m²) needed to heat the water to 80°C.
(b) Calculate the wall temperatures at the inlet and the exit.
(c) Repeat part a) and b) if the velocity of the water is increased to 2 m/s.

$\dot{q} = ?$

$T_{m,i} = 60°C$

$T_{m,e} = 80°C$