8.27

8.27 For oil ($SG = 0.86, \mu = 0.025\ \text{Ns/m}^2$) flow of $0.3\ \text{m}^3/\text{s}$ through a round pipe with diameter of 500 mm, determine the Reynolds number. Is the flow laminar or turbulent?

$SG = \rho/\rho_{H_2O} = 0.86$

$\rho_{oil} = 0.86(\rho_{H_2O}) = 0.86(999) = 859\ \text{kg/m}^3$

$V = Q/A = 0.3/\frac{\pi}{4}(0.5)^2 = 1.53\ \text{m/s}$

$Re = \frac{\rho V D}{\mu} = \frac{(859)(1.53)(0.5)}{0.025} = 2.63 \times 10^4$

Based on the criterion that $Re < 2100$ represents laminar flow, this flow is turbulent.

8.25