Problem 274A
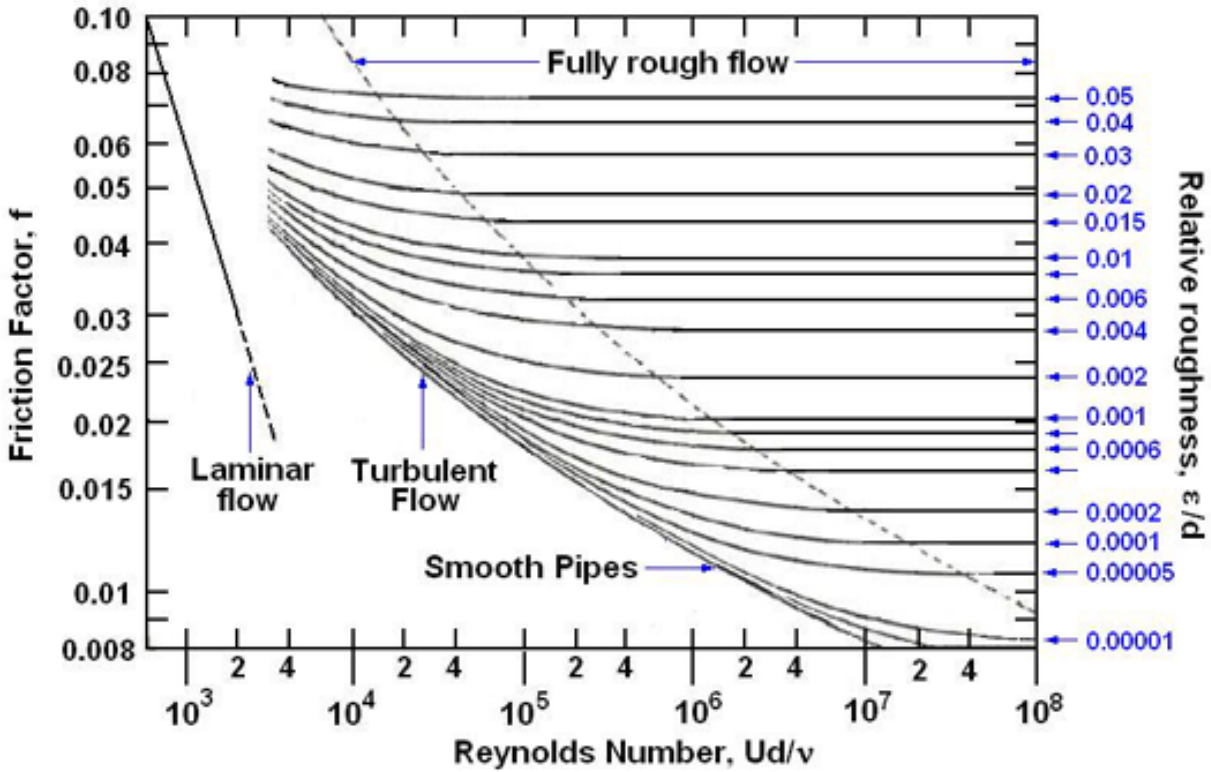
A utility company is laying a new water supply pipe with an internal diameter of 5 cm. The flow rate through this pipe will be 0.05 m^3/s. The kinematic viscosity of the water is 10^{-6} m^2/s.

When new the interior surface of the pipe has roughnesses which are typically 0.05 mm in size. However, as the pipe ages, the engineer estimates that the roughness could increase to 1.0 mm. Using the chart above find the *ratio* of the pressure difference needed to generate this flow when the pipe has aged to the pressure difference required when it is new.