Problem # 1 (20%)
Solve Problem 4.2 p. 81.

Problem # 2 (40%)
Solve Problem 4.4 p. 82 for the quarter sphere. Integrate pressure and calculate the forces in all three directions.

Problem # 3 (20%)
Solve Exercise 5.6 p. 108.

Problem # 4 (20%)
Solve Problem 5.5. Also plot Eq. 5.18 for high Reynolds numbers on the graph below based on recent experiments (from Langnaak and Basson, ASCE-JHE, 2015).

![Graph](image)

**Fig. 5.** Shape factor versus drag coefficient