UNIVERSITY OF CALIFORNIA, DAVIS
DEPARTMENT OF CIVIL AND ENVIRONMENTAL ENGINEERING

COURSE: ENGINEERING HYDRAULICS (ECI 141)
INSTRUCTOR: *Fabián A. Bombardelli* (fabianbombardelli2@gmail.com**,**
fabombardelli@ucdavis.edu**,** bmbrdll@yahoo.com**)**
OFFICE: 3105, Ghausi Hall (former Engineering III building)
Class: Tuesdays and Thursdays-3:10 to 4:30 PM
Website: http://fabianbombardelli.com/ECI141/default_ECI_141.htm

---

HOMEWORK 1: FLUID PROPERTIES, BERNOULLI EQUATION, AND FLOW IN PIPES

Assigned: Saturday, January 20, 2018
Due: Tuesday, January 30, 2018 (in the box, or in my office, or in class)

PROBLEM 1

Please discuss the concept of roughness height in pipes. What is the viscous sub-layer? How can it be computed? *Hint*: Please read Section on "Effect of Rough Walls" in the book.

PROBLEM 2

Explain in words the meaning of the Bernoulli principle, its applicability and limitations. Give examples on where it can be applied and where it cannot be used. *Hint*: See Section 3.5 of book of White, Edition 7^{th}.

PROBLEM 3

Please solve Problem P6.2 from the book, 7^{th} Edition (Alaska pipeline).

PROBLEM 4

Please solve Problem P6.19 from the book of White, Edition 7^{th}. *Answer*: 3.76×10^{-4} ft^2/s.

PROBLEM 5

Please solve Problem P6.25 from the book of White, Edition 7^{th}. *Answer*: 1.9×10^{-6} m^3/s. Yes!

PROBLEM 6

In the problem of the two reservoirs, please compute the minimum pipe diameter for which the flow is not laminar anymore and becomes turbulent for the same configuration.

EXTRA CREDIT PROBLEMS

PROBLEM E1

Please solve Problem P6.27 from the book of White, Edition 7th.

PROBLEM E2

Please solve Problem P6.52 from the book of White, Edition 7th.

PROBLEM E3

From Problem 6, calculate the maximum difference in water elevations in the two reservoirs for which the flow is not laminar anymore and becomes turbulent for the same configuration.