Unified Engineering Fall 2003
Fluids Problem 1
Purpose: Practice using hydrostatic and state relations. Self-assessment.

Part A. (40%) Anderson Problem 1.11

Part B. (40%) Compute the weight of a 1kg mass of aluminum ($\rho = 2.7\text{g/cm}^3$) in vacuum, in air, and in water.

Part C. (20% freebie if completed) Skills self-assessment, with the following objectives:

- To establish the average UE student's understanding of material taught in the prerequisite subjects. The collective information will be reported to the class, and used by the instructor to set the appropriate level of review in subsequent lectures.
- To let you gauge your own level of understanding of the material relative to the average UE student.

Use the following scale for your responses.

1 Poor understanding, or never heard of the concept
2 Weak understanding, probably couldn't apply it properly
3 OK understanding, could apply it with considerable effort
4 Good undertanding, could apply it with little or no trouble
5 Excellent understanding, almost second nature

TOPIC OR CONCEPT	UNDERSTANDING
Equation of state for a perfect gas	1 2 3 4 5
Fluid viscosity	1 2 3 4 5
Vector addition and subtraction	1 2 3 4 5
Scalar (Dot) product of two vectors	1 2 3 4 5
Vector (Cross) product of two vectors	1 2 3 4 5
Vector relations in polar coordinates	1 2 3 4 5
Rotation of vectors between different coordinate systems	1 2 3 4 5
Normal and tangential vectors on surface	1 2 3 4 5
Gradient of a scalar field	1 2 3 4 5
Divergence of a vector field	1 2 3 4 5
Curl of a vector field	1 2 3 4 5
Stokes Theorem	1 2 3 4 5
Gauss (Divergence) Theorem	1 2 3 4 5
Gradient Theorem	1 2 3 4 5
Line, Surface, Volume integrals	1 2 3 4 5
Conservation of mass	1 2 3 4 5
Conservation of linear momentum	1 2 3 4 5
Conservation of angular momentum	1 2 3 4 5