

Homework Set 1

Due: Thursday, August 25 (sections 001, 003, and 004)/Friday, August 26 (section 002)

This assignment is to be completed individually. The number in parentheses next to each problem shows how many points the problem is worth in the overall assignment. Please show all work and use correct significant figures to receive full credit. Be sure to follow the problem formatting instructions to avoid unnecessary deductions. If you use an equation-solving tool (calculator, APEX, Solver, MATLAB), write out the equation(s) and note the tool that you used; otherwise, show all hand calculations used to solve any equations.

- (10 pts)** What would you consider your main strengths and interests that led you to pursue your choice of major? Read Chapter 1 from FR&B; which of the pursuits in Ch. 1 strikes you as the most suitable job environment for you, and why? This should be typed and printed out, one page max, and does not have to be submitted on engineering paper.
- (15 pts)** Using dimensional equations, convert
 - 2 weeks to microseconds
 - 38.1 ft/s to kilometers/h
 - $554 \text{ m}^4/(\text{day} \cdot \text{kg})$ to $\text{ft}^4/(\text{min} \cdot \text{lb}_m)$
- (20 pts)** You are trying to decide which of two automobiles to buy. The first is American-made, costs \$28,500, and has a rated gasoline mileage of 28 miles/gal. The second car is of European manufacture, costs \$35,700, and has a rated mileage of 19 km/L. If the cost of gasoline is \$3.25/gal and if the cars actually deliver their rated mileage, estimate how many miles you would have to drive for the lower fuel consumption of the second car to compensate for the higher cost of this car.
- (25 pts)** The cost of a single solar panel lies in the range of \$200 to \$400, depending on the power output of the panel and the material it is made from. Before investing in equipping your home with solar power, it is wise to see whether the savings in the cost of electricity would justify the amount you would invest in the panels.
 - Suppose your monthly electrical usage equals the national U.S. household average of 948 kWh. Assuming an average of five hours of sunlight per day and a 30-day month, calculate how many panels you would need to provide that amount of energy and what the total cost would be for each of the following two types of panels: (i) 140W panel that costs \$210; (ii) 240W panel that costs \$260. What is your conclusion?
 - Suppose you decide to install the 240W panels, and the average cost of electricity purchased over the next three years is \$0.15/kWh. What would the total cost savings be over that 3-year period? What more would you need to know to determine whether the investment in the solar panels would pay off? (Remember that a solar power installation involves batteries, AC/DC converters, wires, and considerable hardware in addition to the solar panels themselves.)
 - What might motivate someone to decide to install the solar panels even if the calculation of Part (b) shows that the installation would not be cost-effective?

(30 pts) The remainder of the assignment (3 problems) will be completed online *individually* using WileyPLUS. *You do not have to turn in any paperwork with this portion of the assignment.* To access the assignment, first register using the link on the Moodle site, and then you can access the Assignment within WileyPLUS. The due date for the WileyPLUS completion is the same as for the homework assignment – the beginning of your class period. Note that the WileyPLUS assignment cannot be submitted late.