Due in class or my office hours, Friday, February 2.

1) Multiple choice and short answer:
   a) (2 pnts) A sled weighs 100 N and has a coefficient of static friction with the ground of $\mu_s=0.2$. A child pushes the sled on level ground with a force of 10 N. Which of the following is true?
      i) The sled starts to move.
      ii) The friction force is zero.
      iii) The sled remains stationary.
      iv) The weight of the sled increases.
   b) (2 pnts) A submerged submarine is moving at constant velocity through the water. The net force acting on it is
      i) zero
      ii) the force of water resistance
      iii) its surface area times the pressure of the water.
      iv) the thrust from the propeller minus its weight.
   c) (4 pnts) Does the centripetal force acting on an object traveling in a circle do work on the object? Explain.
   d) (2 pnts) You wish to accelerate your car at a constant acceleration. To do so, the car’s engine must (hint: see Eqn. 6-19)
      i) maintain a constant power output.
      ii) develop ever decreasing power.
      iii) develop ever increasing power.
      iv) maintain a constant turning speed.

2) Questions Q5-16 and Q5-30. Objects moving through air.
3) Exercise 5-7. Equilibrium of forces.
4) Exercise 5-15. Atwood’s machine.
5) Exercise 5-25. Boxes sliding with friction.
6) Exercise 5-37. Static friction.
7) Do Exercise 5-40. Then show explicitly by differentiation and substitution that Eqn. 5-10 in the textbook satisfies Newton’s second law for an object falling through a liquid:

   \[ m \frac{dv}{dt} = mg - kv = k \cdot (v_t - v) \quad \text{with} \quad v_t = \frac{mg}{k}. \]

   Finally, derive Eqn. 5-13 in the textbook, starting with Newton’s second law and Eqn. 5-8.
8) Exercise 5-39. Inclined plane with friction.
9) Problem 5-91. Banked roadway.
11) Problem 5-100. Riding a motorcycle in a sphere. (Answers: 11.3 m/s and 5390 N)
12) Problem 6-5. Work done to push a crate.