EXAM 4

Name: ________________________________  Student ID #:___________________________

TA (circle one):  Adam  Isaac  Michael  Sarah  Will

A.  [9 pts.] The pictures below depict three glass vessels, each filled with a liquid. The liquids each have different densities, and \( \rho_A > \rho_B > \rho_C \). In vessel C an unknown block is neutrally buoyant halfway to the bottom and completely submerged.

A  B  C

A, B, and/or C, or none are all possible answers.

1. **N O N E**  In which vessel(s) would the block sink all the way to the bottom?

2. **A**  In which vessel(s) would the largest volume of the block be exposed above the surface of the liquid?

3. **A, B, C**  In which vessel(s) would the buoyant forces on the block be the same?

B.  [15 pts.] A swinging pendulum (A) and a mass-spring system (B) are built to have identical periods. For the statements below enter either A, B, U (unchanged) to best fit which oscillating system would have the larger period as a result of the change.

1. **B**  The mass of the mass-spring system is increased.

2. **U**  The mass of the swinging pendulum is increased without altering the location of its center of mass.

3. **A**  The spring constant of the mass-spring system is increased.

4. **A**  The length of the swinging pendulum system is increased.

5. **A**  Both systems are taken to the moon and set oscillating.

C.  [9 pts.] A block of mass \( m \) moves back and forth on a frictionless surface between two springs. See drawing. Assume \( k_L > k_R \). For the statements below enter L for the left spring, R for the right spring, or S (same) as the case may be.

1. **R**  The spring that has the maximum compression when \( m \) is momentarily at rest.

2. **S A M E**  The spring that stores the larger elastic potential energy when maximally compressed.

3. **L**  The spring that momentarily stops the block in the least time once the block arrives at the spring.