1. (4 pts) Remove the 2 equation sheets, leaving the exam questions stapled together.
CLEARLY PRINT the information below. If we can’t read it, you will not get these free points!

Name: ___________________________________________________  EF 152 Section: ____________
NetID: ____________________________ (your computer login, NOT your student #, e.g. bpearl)

2. (8 pts) The system is in equilibrium. Find the force (\( F \)), if the tension in the cable attached to the left end of the bracket is 50N. \textbf{FBD required for full credit.}

3. (8 pts) A ball has a volume of 0.0015m\(^3\). The ball is completely submerged in a lake and released. If the acceleration of the ball the instant it is released is 0.85m/s\(^2\) towards the bottom of the lake, what is its mass? \textbf{FBD=KD required for full credit.}
4. (8 pts) Water enters the first floor of Estabrook Hall through a pipe with an inside diameter of 3.0 cm at a
gauge pressure of $2.9 \times 10^5$ Pa. A 4.5 cm inner diameter pipe leads to the bottom bathroom floor 5.0 m
below. If the flow speed at the inlet pipe on the first floor is 2.0 m/s, what is the pressure in the bathroom
below?

5. (8 pts) A 2 kg mass oscillates in simple harmonic motion with the displacement as a function of time
given by $x = 3.8 \cos\left(\frac{5\pi}{4} t + \frac{\pi}{6}\right)$ where $t$ is in seconds and $x$ is in centimeters. Determine the total
mechanical energy of the system.
6. (8 pts) A 0.33 mm diameter 65 cm long string made of brass (density of 7760 kg/m$^3$) is subjected to a tension force of 122 N. In order to amplify the sound made by the string when it is plucked, it is placed over an open tube. What should be the length of the tube to provide maximum amplification of the sound? Assume the speed of sound in air is 343 m/s.

7. (8 pts) Two automobiles are equipped with the same single-frequency horn. When one is at rest and the other is moving toward the first at 10 m/s, the driver at rest hears a beat frequency of 4.5 Hz. What is the frequency of the horn? Assume the speed of sound is 343 m/s.
8. (8 pts) A pan with 2.0 liters of water at 26°C is placed on a stove. 1000 kJ of heat is added to the water. How many grams of steam were produced?

9. (8 pts) 160 J of heat are added to a gas as it goes from A to B. Determine the change in internal energy of the gas.
10. (8 pts) A standard cylinder of oxygen used in a hospital has a gauge pressure of 13800 kPa and a volume of 0.014 m³ at a temperature of 295K. The flow rate measured at atmospheric pressure (101.3 kPa) and 295K is 2.4 L/min (0.0024 m³/min). How long can the cylinder be used before it runs out of oxygen? Molecular weight of oxygen is 32 gram/mole.

11. (8 pts) Two point charges, one of +2.5 μC and the other of -3.5 μC, are placed on the x-axis, one at the origin and the other at x=0.6 m. Find the position on the x-axis where the net force on a positive third charge (+q) would be zero.
12. (8 pts) In the following picture, the potential difference across ab is 50V. Find the total charge stored between points a and b.

13. (8 pts) The current through the 6.00 Ω resistor is 4 A (in the direction shown). What is the power dissipated by the 25.0 Ω resistor?