MEMS 0051
Spring 2019
Midterm #1
2/15/2019

Name (Print): _____

This exam contains 2 pages (including this cover page) and 2 problems. Check to see if any pages are missing. Enter all requested information on the top of this page, and put your initials on the top of every page, in case the pages become separated.

You may *not* use your books or notes. Calculators are permitted on this exam.

The following rules apply:

- All work must be done in the blue testing book. Any work done on the exam question sheet will not be graded.
- All work must be substantiated. A result with no methodology and mathematics will not be graded.
- Do not write in the table to the right.

Problem	Points	Score
1	50	
2	50	
Total:	100	

Bonus: This day, February 15$^{\text{th}}$, 1933, marks the naming of the first United States aircraft carrier. What was the name of this aircraft carrier?

Written Problem #1

1. (50 points) A piston-cylinder device initially contains 0.4 [m^3] of helium at 100 [kPa] and a temperature of 80 °C. The helium is then compressed to a volume of 0.1 [m^3] and a pressure of 80 [kPa]. Determine the heat removed from the system, as well as the work required to compress the piston. Ensure that helium is able to be treated as an Ideal gas during this process.

Written Problem #2

2. (50 points) 10 [kg] of water in a piston-cylinder device goes from an initial state of 99.62 °C and 500 [kPa] to a final state of 99.62 °C and 20 [kPa] in an isothermal process. Determine the amount of heat supplied to and the work done by the system. *Hint: this process is not purely isothermal.*