Rules for the Lab Proficiency Quiz

- A 30 minute quiz on Carmen
- Closed book/notes
- Equation sheet will be provided
- Cell phones off
- Test is done individually
- Be on time
- Bring a calculator and a pencil or pen
- Location: Your lab room at the beginning of Lab 8
- Format
  - Short Answer
  - Calculations
  - Multiple choice
Lab 2: Arduino Programming Basics

Give a brief explanation of the following:

- `celerate(1,0,20,5);`
  - Accelerate motor 1 from 0% to 20% in 5 seconds

- `motorSpeed(4,23);`
  - Set motor speed to 23% for all motors

- `goFor(3);`
  - Continue previous statement for 3 seconds

- `brake(4);`
  - Brake all motors
Lab 2: Arduino Programming Basics

- If I have to write a very simple code I will
  - A.) not forget the semi-colon ;
  - B.) not forget what letters are in CAPS (syntax)
  - C.) Remember the proper arguments for 7 basic commands
  - D.) not forget the semi-colon ;
  - E.) All of the above because I studied my stuff and I am going to ace this test!
Lab 2: Arduino Programming Basics Continued

- goFor(____); has one argument inside the parenthesis. What is that argument and how is it inputted?
  - Time, in seconds.

- reverse(____); what argument goes inside the parenthesis?
  - Motor number
AEV Parts Continued

- What is the object on the left and what is it used for?
  - Reflectance Sensor
    - Used to compute distance
    - Used to determine relative position

- In ONE wheel revolution how many marks/counts will be recorded?
  - 8 marks
Lab 4: External Sensors

- **goToRelativePosition( ____ );**
  - I want the AEV to go for 4 feet (48 inches), what do I put as the input in the function call above?
  - Note: There are 0.4875 inches/mark. Round to the nearest whole number.
    - Marks = 48/.4875 = 98.4615 = 98 marks.

- **goToAbsolutePosition( ____ );**
  - Same functionality as **goToRelativePosition()**, but what is different?
Lab 2: Arduino Programming Basics Continued

- I want to write a code to have the AEV
  - Accelerate all motors from 0 to 26 percent power in 4 seconds.
    - accelerate(4,0,26,4);
  - Set motor 1 motor speed to 30 percent power.
    - motorSpeed(1,30);
  - Continue the previous statement for 10 seconds.
    - goFor(10);
  - Decelerate motor 2 to zero percent power in 9 seconds
    - accelerate(2,26,0,9);
Lab 5: System Analysis I

Given the following EEPROM Data can you calculate (Reference Voltage is $V_R=2.46$):

- **Time** ($t = \frac{t_e}{1000}$):
  - 1.056 seconds

- **Current** ($I = \left(\frac{I_E}{1024}\right) \times V_R \times \left(\frac{1\text{ Amp}}{0.185\text{ Volts}}\right)$):
  - 1.19 Amps

- **Voltage** ($V = \frac{15 \times V_E}{1024}$):
  - 7.05 Volts
Given the following Data can you calculate:

- **Distance** \( s = 0.0124 \times Marks \)
  - \( s = [0.73, 0.77] \) Meters

- **Velocity** \( v_i = \frac{s_i - s_{i-1}}{t_i - t_{i-1}} \)
  - \( v = 0.20 \) m/s

- **Supplied Power** \( P = V \times I \)
  - \( P = [0.1835, 0.1819] \) Watts

- **Incremental Energy** \( E_i = \frac{P_i + P_{i+1}}{2} \times (t_2 - t_1) \)
  - \( E_i = 0.0359 \) Joules
Lab 7: System Analysis III

- Propeller Advance ratio is a function of what three variables:
  - Velocity, RPM, Propeller Diameter

  \[ J = \frac{v}{\left(\frac{RPM}{60}\right) \times D} \]
Lab 7: System Analysis III

- $J = \frac{v}{(\frac{RPM}{60}) \times D}$

- Compute the Propeller Advance Ratio. *(Note: Assume with power & remember constraints in $J$).* You are using a 3 inch propeller. Round to the nearest *hundredth*.
  - The RPM is 1235.10 rpm and the velocity is 0.12 m/s
    - 0.08
    - BUT applying the constraint we get 0.15
  - The RPM is 1211.23 rpm and the velocity is 0.24 m/s
    - 0.156 .... are we within the constraints??
    - YES!!!
Lab 7: System Analysis III

- Given the following setup, what is the propeller configuration?
  - Pusher

- What is the other configuration?
  - Puller/Tractor