

Group Members: \_\_\_\_\_

Date: \_\_\_\_\_

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# Lab 7 - MIPS I

## 1 Objective

To model, introduce identifiers, simplify, solve, and interpret a dynamic system of your own choosing.

## 2 Procedure

1. Pick a cool, everyday dynamic system. (The more creative the better.) Some examples: a swing, a yo-yo, your body, a kitchen device, washing machine...
2. Perform MIPS I on the system.
3. Turn-in one lab per group.

## 3 MIPS I

**Model Physical System:** Capture the essential components of the physical system being analyzed and draw a simple sketch of the model.

**Identifiers, symbols and values:** Name and label relevant parts. Analytically or empirically determine physical constants.

**Physics:** Form equations, e.g., with  $F = ma$  and  $V = iR$ . Using physical principles formulate equations that relate the identifiers and govern the behavior of the system.

**Simplify and solve:** When helpful, make small angle or linear approximations ( $\sin(\theta) \approx \theta$ ). Produce numerical or closed form solutions for the unknown identifiers, e.g., separation of variables, assumed solutions, numerical solutions of ordinary differential equations.

**Interpret, design, and control physical systems:** Using numbers, plots, animation, etc., generate results that can be easily interpreted, preferably by a non-technical person.