MEM 351 Pre-Report Format

Each group must submit (to their TA) one 5-page Pre-Final Report. Follow the following structure for the report:

1. Introduction
   - Final objective of the course
   - Motivation

2. Theory (refer to Homework 1)

   - Compound pendulum equations of motion
     - Free-body-diagram
     - Derivations of equations of motion
     - General 2nd order differential equation
     - Derivation for calculating the damping ratio and natural freq
     - Derivation for calculating the viscous damping coefficient and moment of inertia

   - Pole locations (based on Lecture entitled “Dynamic Equations of Motion”)
     - Relationship between pole values, damping ratio and natural frequency

3. Experimental setup (refer to Labs on LabVIEW NI-DAQ Basics 1 and 2, and System Identification)

   - Photo of pendulum setup, text labels highlighting parts
   - Hookup sketch e.g. encoder to PCI-6025E screw terminals
   - Screen shot of encoder reading VI (front panel and block diagram)
   - Relevant dimensions e.g. bar length, mass, distance between pivot point and center-of-mass

4. Experimental results

   - Encoder angle data vs. time (Lab entitled “System Identification”)
   - Calculations for damping ratio and natural frequency
   - Calculations for moment of inertia
   - Calculations for viscous damping coefficient
   - Mathematically validate that pole locations indeed yield natural frequency and damping ratio (Lecture entitled “Representations, Transfer Functions, Poles and Zeros”)

Use photos and sketches etc to highlight your report. A good job on this 5-page report will make help minimize your work when creating the compiled report.