# Experiment A1
# Meter Stick Measurements
Procedure

Email: prumbach@nd.edu

Deliverables: Checked lab notebook, tech memo

## Overview

In this lab, you will each be given two official AME 20216 meter sticks. The meter stick is the most basic scientific instrument, and you will use it to measure the height of the Hesburgh Library. The overall goal of this lab is to show that a bit of ingenuity can greatly simplify a seemingly impossible measurement.

## Part I: Height of the Hesburgh Library

1. Use two of the meter sticks and Google maps satellite images to measure the height of the Hesburgh Library by applying the concept of *similar triangles*. (Do not climb any buildings or fences!)
2. Sketch a schematic of your experimental method and record your measured values in your lab notebook.
3. Calculate the pressure in units of psi necessary to pump water to the top of the library.
4. Do a bit of online research to determine the actual height of the library. (Be sure to cite the source in your tech memo.)

**Deliverables** – Using the format and style outlined on HW1, write a brief tech memo containing the following items.

1. A table containing the following.
    a. The height of the library you measured compared to the actual value (in feet). Be sure to include a citation for the actual value.
    b. Based on the height you measured, calculate the pressure (in psi) necessary to pump water to the top of the library. Use the formula for hydrostatic pressure $p = \rho_w g h$, where $\rho_w = 1000$ kg/m$^3$ is the density of water, $g = 9.8$ m/s$^2$ is the acceleration due to gravity, and $h$ is the height.
2. Create a simple schematic illustrating the technique you used to measure the height of the water tower. The drawing must be produced using computer software. (i.e. Power Point, Adobe Illustrator, Photoshop, etc.).

## Suggested Talking Points

- How does the height of the library you measured compare with the actual value? If it does not agree, discuss potential ways to improve your measurement technique.
- As an engineer, what would you do to get water up to the top floor of the library?

# Appendix A

## Equipment

- Smart phone
- Laptop computer
- Official AME20216 meter stick (Yours to keep!)