# M E 345

Lecture 02

## Today, we will:

- Review: Do some more example problems significant digits
- Review the pdf module: Dimensional Analysis and do some example problems
- Review the pdf module: Review of Basic Electronics

# **Example: Significant digits**

Given: Three quantities are measured: a = 7.55, b = 6.044, and c = 10.451.

## To do:

(a) Calculate a - b, giving your answer to the appropriate precision and number of significant digits.

# Solution:

(b) Given the same three quantities: a = 7.55, b = 6.044, and c = 10.451. Calculate a + b + c, giving your answer to the appropriate precision and number of significant digits.

## Solution:

(c) Given the same three quantities: a = 7.55, b = 6.044, and c = 10.451. Calculate the average of a, b, and c to the appropriate precision and number of significant digits.

## Solution:

**Example: Primary dimensions – shear stress, force per unit length, and power** (*a*) **Given**: In fluid mechanics, shear stress  $\tau$  is expressed in units of N/m<sup>2</sup>.

**To do**: Express the primary dimensions of  $\tau$ , i.e., write an expression for  $\{\tau\}$ . **Solution**:

(b) Given: Ray is conducting an experiment in which quantity *a* has dimensions of force per unit length.

**To do**: Express the primary dimensions of a, i.e., write an expression for  $\{a\}$ . **Solution**:

(c) Given: Power  $\dot{W}$  has the dimensions of energy per unit time.

**To do:** Write the dimensions of power in terms of primary dimensions. **Solution**:

Example: Dimensional analysis – shaft power		
Given:	The output power $\dot{W}$	of a spinning shaft is a function of torque $T$ and angular
velocity <i>w</i> .		

**To do**: Express the relationship between  $\dot{W}$ , *T*, and  $\omega$  in dimensionless form.

Solution:

Step 1:

Step 2:

Step 3:

Step 4:

Step 5:

Step 6: