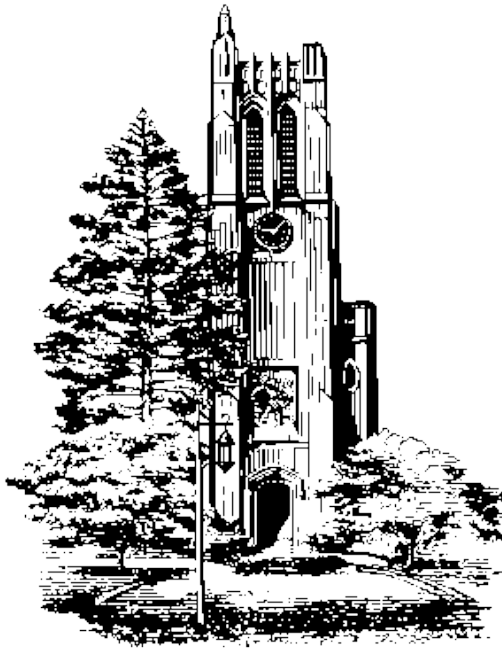# Lecture 01

Thursday September 1st , 2016

Notables

- Homework #1 will be posted on September 8th
  - Due Thursday Read: Top 10 Simple Things Every Computer User Should Know How to Do
  - http://lifehacker.com/5941496/top-10-simple-things-every-computer-user-should-know-how-to-do
- Activate your Piazza account once notified
- Forthcoming topics:
  - Math review
  - System review

Massive Open Online Courses (MOOCs)

- Major sites:
  - Coursera: https://www.coursera.org/
  - Udacity: https://www.udacity.com
  - edX; https://www.edx.org/
- Other site:
  - Khan Academy: https://www.khanacademy.org/
  - …
- Sign up to Udacity and listen to the first lecture of the course Web Development.

Refreshing your math

- What is a set?
- What is a function?
- Compute the following:

$$\log_{10} 8 + \log_2 25 =$$

- Expand the following

$$\sum_{n=0}^{5} \sin 2\pi nt =$$

What is a *Set* ?

- Definition: A *set* is an *unordered* collection of objects, called the *elements* or *members* of the set. A set is called to *contain* its elements.
  - Example: {car, 201, pen, ipod, 6.9, river, {10101, key}}
- Note that the definition of a set does not require any relationship among the members of a set.
- In a set, repeated elements are ignored.
- The order of the elements in a set is irrelevant; it does not make sense to ask for the k-th element of a set.
- To indicate the fact that:
  - x is an element of the set S, we write: $x \in S$
  - x is not an element of the set S, we write: $x \notin S$

Some Important Sets

- The set of Natural Numbers
  $N = \{0, 1, 2, \ldots\}$
- The set of Integers
  $Z = \{\ldots, -2, -1, 0, 1, 2, \ldots\}$
- The set of Positive Integers
  $Z^+ = \{1, 2, \ldots\}$
- The set of Rational Numbers
  $Q = \{p/q \mid p$ and q are integers, and q is not zero$\}$
- $R =$ The set of real number
- The empty set

  $\{\}, \emptyset$

Subsets of a set

- **What is a subset of set?**
  - X is a subset of a set Y if whatever is in X is also in Y.
  - Example: The subsets of {1,2,5} are
    {},{1},{2},{5},{1,2},{1,5},{2,5},{1,2,5}
- **How many subsets does a set of n elements have?**
  - Note that the answer does not depend on the *nature* of the elements in the set, rather on the size of the set
  - 2^n