Introductory Lesson 1 – What Is Calculus and Why Is It Useful?

**Calculus** is the study of two main types of change:

1. **Rate of change**
   - A rate of change measures how quickly one quantity is increasing or decreasing with respect to another.

Calculus can help answer the following questions about rates of change:

(a) **Moving car**
   - Given position at time \( t \), what is the rate of change of position (velocity) at time \( t \)?

(b) **Swim time of the 100-meter freestyle**
   - Given the swim times of an average athlete at age \( x \) years, at what age is the swim time minimum?

(c) **Geometry**
   - How steep is a curve at a point?

2. **Accumulated change** is the net or total accumulation of all intermediate changes in a quantity.

Calculus can help answer the following questions about accumulated change:

(a) **Moving car**
   - Given an initial position and the velocity over a time interval, what is the final position and/or the total distance traveled?

(b) **Swim time of the 100-meter freestyle**
   - Given the rate at which swim time is decreasing between the ages of 25 and 30, how many seconds in swim time are added during these years?

(c) **Geometry**
   - What is the area of a plane region bounded by a curve?

For next class:
1. Attempt to log on to WeBWorK using the web address, username, and password provided by your instructor.
2. Purchase the required calculator.