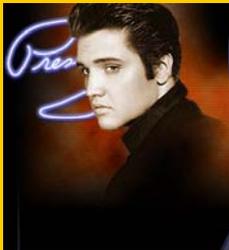


# Lesson 1

## Integral Calculus and Introduction to Differential Equations

“Truth is like the sun. You can shut it out for a time, but it ain't  
goin' away.”



Elvis A. Presley

**MA205**  
**LTC Billie**

# Lesson 1

## Integral Calculus and Introduction to Differential Equations

“MA 205 is like the sun. You can shut it out for a time, but it ain't goin' away.”



LTC J. Scott Billie

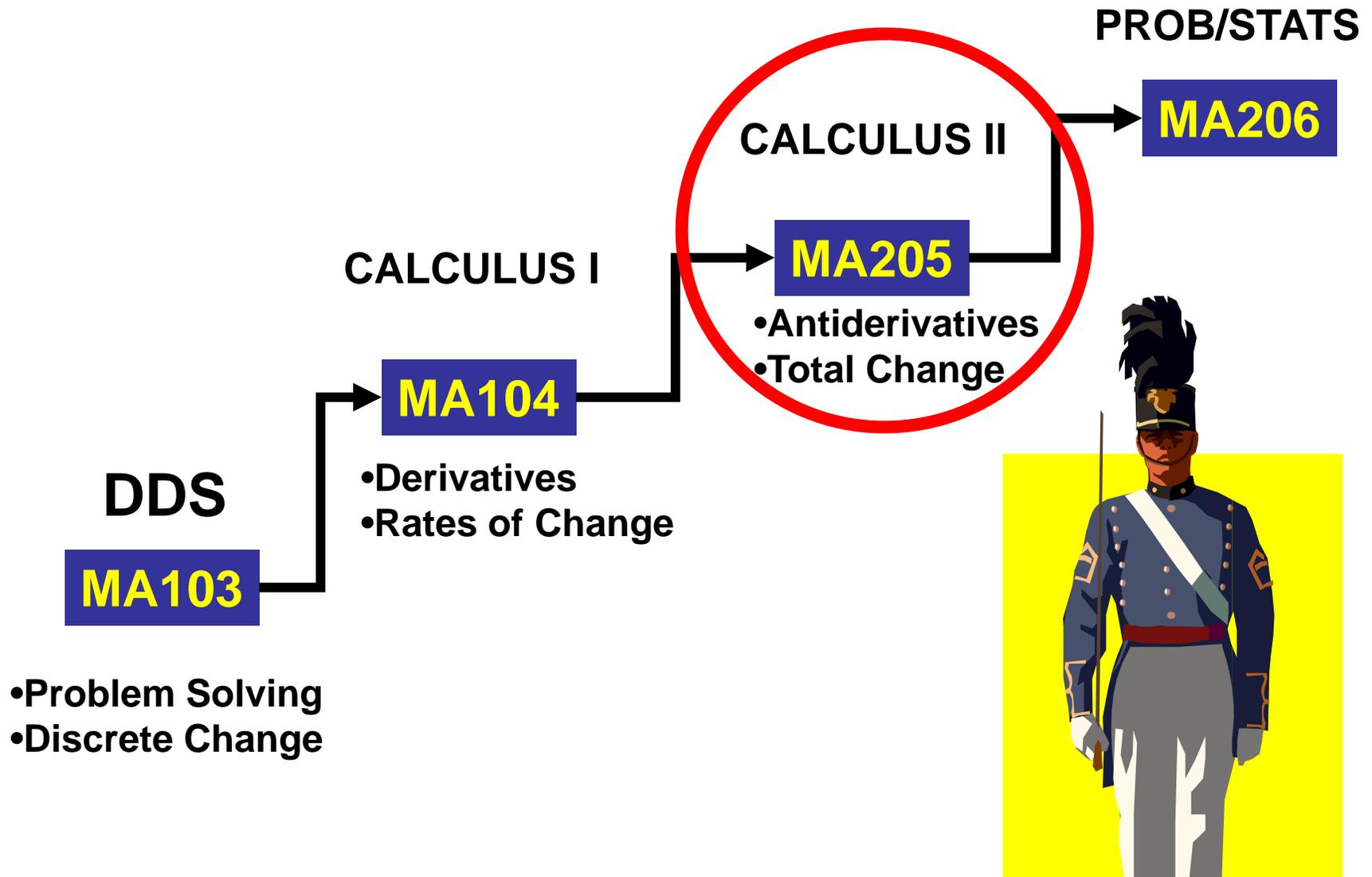


**MA205**  
**LTC Billie**

# INTRODUCTION

- **LTC J. Scott Billie**
- **USMA - 1986**
- **Armor Branch/FA 49**
- **TH 253**
- **938-0209 (W)**
- **Teach A/B/D – G/H/J Hours**
- **John.billie@usma.edu**

# CORE MATHEMATICS



# MA205 OVERVIEW

**Calculus II. This course builds upon the foundation laid in MA104, as the cadet learns about integral calculus in single and multi-variable problems.**

**Block 1: Integral Calculus (Single Variable)**

**Block 2: Integral Calculus (Multi-Variable)**

**Block 3: Modeling with Differential Equations**

**Block 4: Engineering Sequence**

# EVALUATION PLAN

- Course-wide events → course guide
- Grading scale → course guide
- Instructor Points

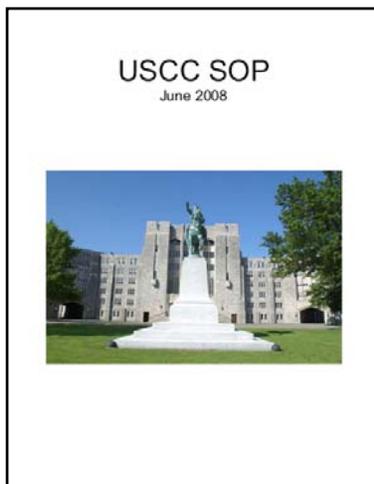
# CHAPTER 8

## ACADEMIC PROCEDURES

### 800. General Academic Policies.

1. **Personal Responsibilities**. The primary responsibility for achieving satisfactory academic performance **rests with the individual cadet**. Cadets must develop a sense of personal responsibility for the achievement of the highest level of academic

achievement of which they are capable. To meet this responsibility, cadets have an obligation to know their academic status, manage their time, and establish effective priorities. The performance of academic duties is a significant part of the process of preparing for the acceptance of the duties and responsibilities of Army officers. The standard for performance of academic duties is the same as that for the performance of officer duties -- excellence and one's personal best.



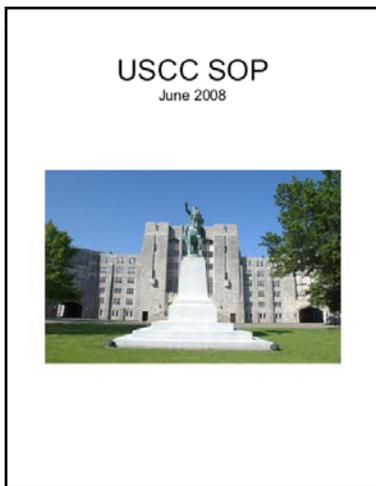
# CHAPTER 8

## ACADEMIC PROCEDURES

### 800. General Academic Policies.

5. **Course Materials.** Cadets will ensure that they **possess all required textbooks, course material and accessories prior to the start of each academic course**, except for any material designated

for issue in class. Cadets will not rely on using others' materials; they must have sole use of the book or other item for the entire term. Cadets should also have an individual copy of the 1 day/2 day schedule (Buff Card) for the current academic year.

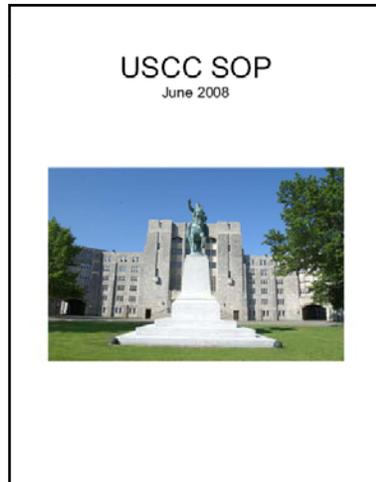


# CHAPTER 8

## ACADEMIC PROCEDURES

### 801. General Class Attendance Guidance.

3. **Conflicts**. Conflicts among required duties may arise occasionally. Cadets are responsible to identify such conflicts as early as possible and resolve them expeditiously.

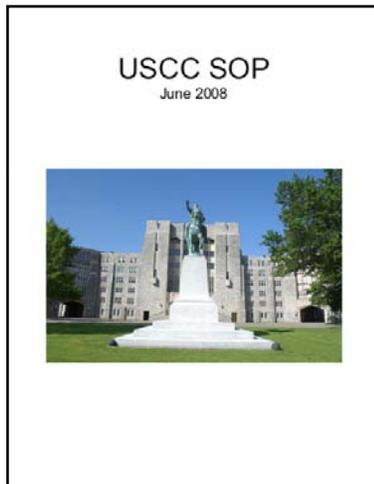


# CHAPTER 8

## ACADEMIC PROCEDURES

### 802. Classroom Procedures.

#### 2. Conduct.



(c) Smoking, using smokeless tobacco, chewing gum, and consuming food is prohibited at all times in classrooms, lecture halls, and auditoriums.

(d) At Department Head discretion, drinks are permitted in selected classrooms during duty hours. All beverages, except plain water must be contained in an approved closed container. The only approved models of closed containers will be sold at the C-Store\* and no other closed containers are permitted.

\*For a nominal fee.

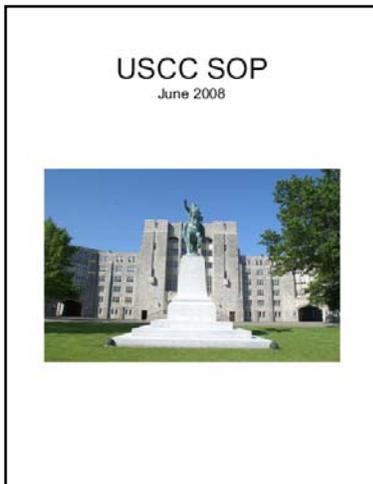
# CHAPTER 8

## ACADEMIC PROCEDURES

### 805. Additional Instruction (AI).

#### 1. a. Academic.

(1) Additional instruction is instruction on course material supplemental to that presented during normal class time as scheduled in the course syllabus.



(2) Additional instruction is normally presented by the cadet's regularly assigned instructor, but in any case by an instructor of the department presenting the course.

(3) Material covered in AI is restricted to that previously covered during regularly scheduled class attendance. Coverage of future material (pre-teaching) is not permitted.

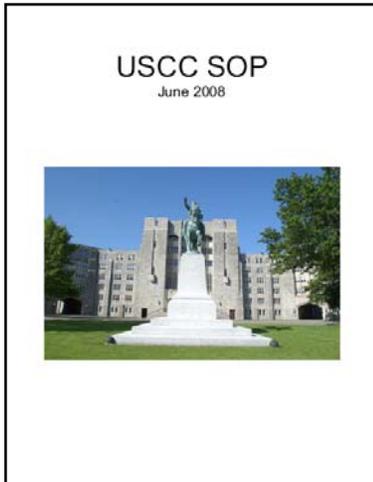
## CHAPTER 8

### ACADEMIC PROCEDURES

#### 813. Additional Instruction (AI).

##### a. Academic.

(4) AI may be scheduled in accordance with the Academy schedule. Departments are encouraged to arrange times for AI that are mutually agreeable to cadets and the department, particularly in the cases of cadets who bear heavy institutional responsibilities. AI will not be conducted during the evening study period without the prior approval of the Dean. Although AI is not normally presented during the TEE period, specific questions addressed by cadets to instructors will be answered.



(5) Though AI is optional, once cadets have made appointments to receive AI or otherwise committed to attend AI at a specified time, attendance becomes mandatory and cadets will be reported if absent. Cadets are responsible to avoid conflicts or to resolve them should they occur.

# CLASS PROCEDURES

- **BEFORE CLASS**
  - Required materials
  - Appearance / conduct
- **FLOW OF CLASS**
  - Required materials
  - Questions from readings on boards
  - Section marcher gives report
  - Boards & briefing, quizzes
  - Lesson Link
  - **Use of Internet, IM, email in class**
- **ATTENDANCE**
  - Notification of Known Absence
  - Duty
  - WPR Attendance

# Admin Info

## MA205 Webpage

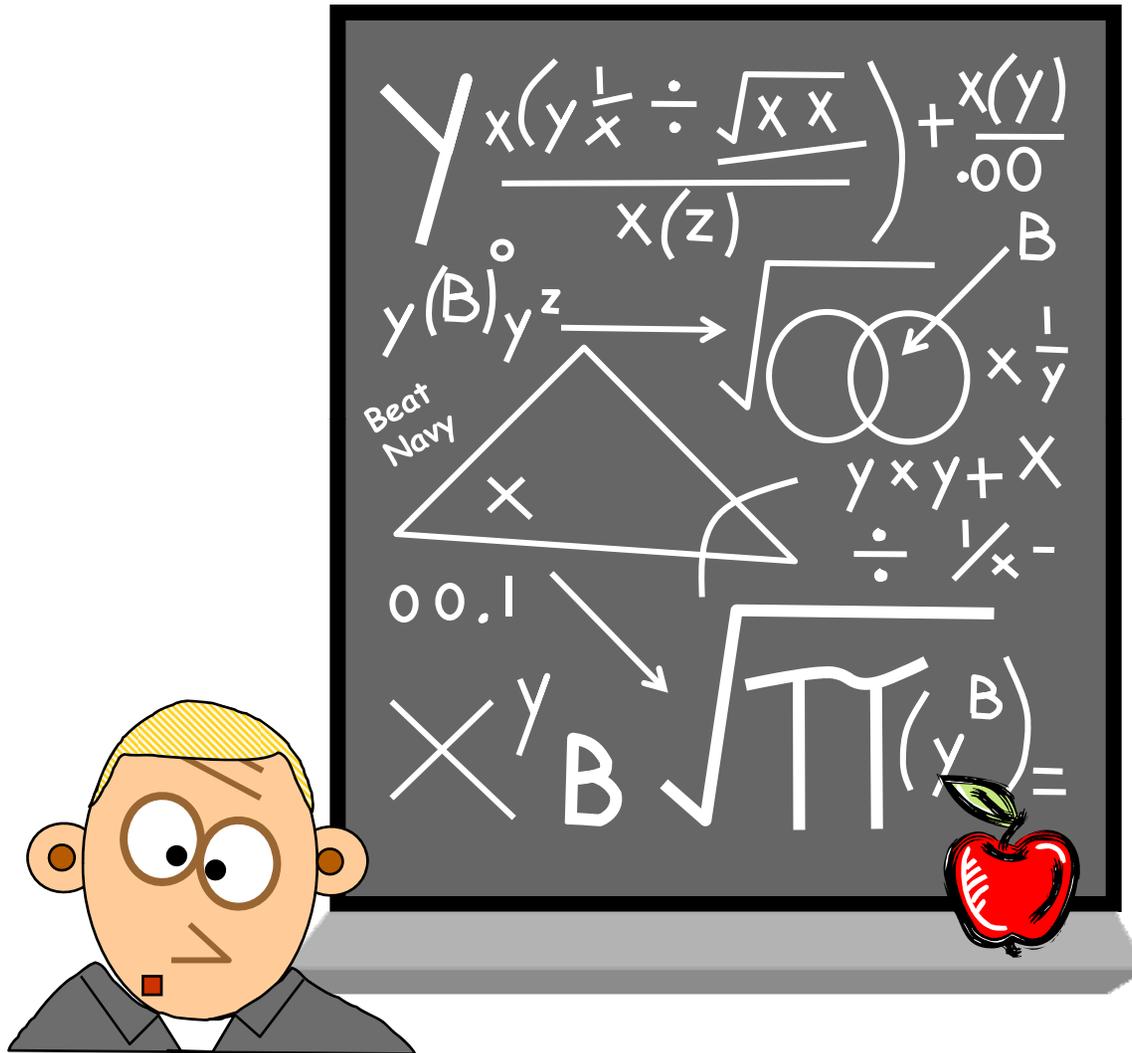
<http://www.dean.usma.edu/departments/math/courses/ma205/>

<http://www.dean.usma.edu/departments/math/personel/billie/>

# Admin Information

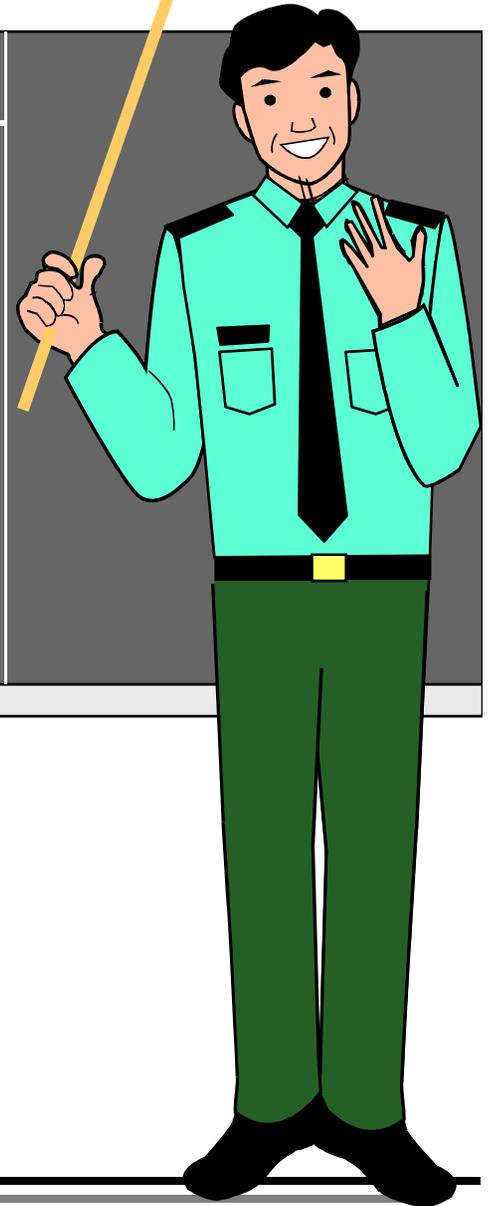
## DOCUMENTATION OF WRITTEN WORK

# Incorrect Blackboard Set up



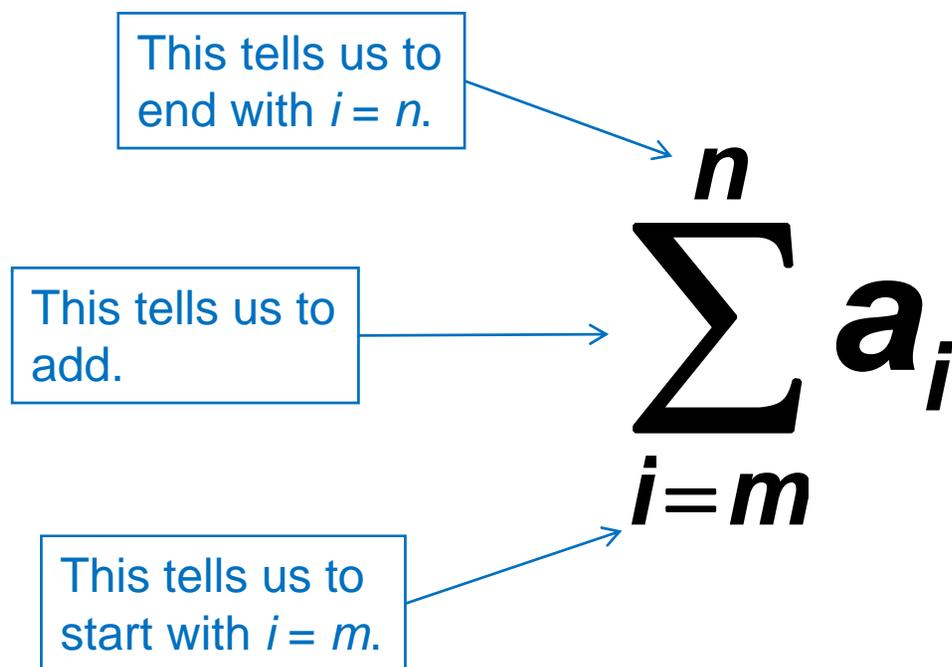
# Correct Blackboard Set up

<p>1</p> $f(x) = 5x^2 + x + 6$ $\underline{\underline{f'(x) = 10x + 1}} \text{ANS}$	<p>3</p> <p>LTC Billie</p> $h(x) = (x^2 + 4)(x^3 + 5)$ $h'(x) = (x^2 + 4)3x^2 + (x^3 + 5)2x$ $= 3x^4 + 12x^2 + 2x^4 + 10x$ $\underline{\underline{= 5x^4 + 12x^2 + 10x}} \text{ANS}$
<p>2</p> $y = x^{-2/5}$ $\underline{\underline{y = -2/5 x^{-7/5}}} \text{ANS}$	



# Summation Notation

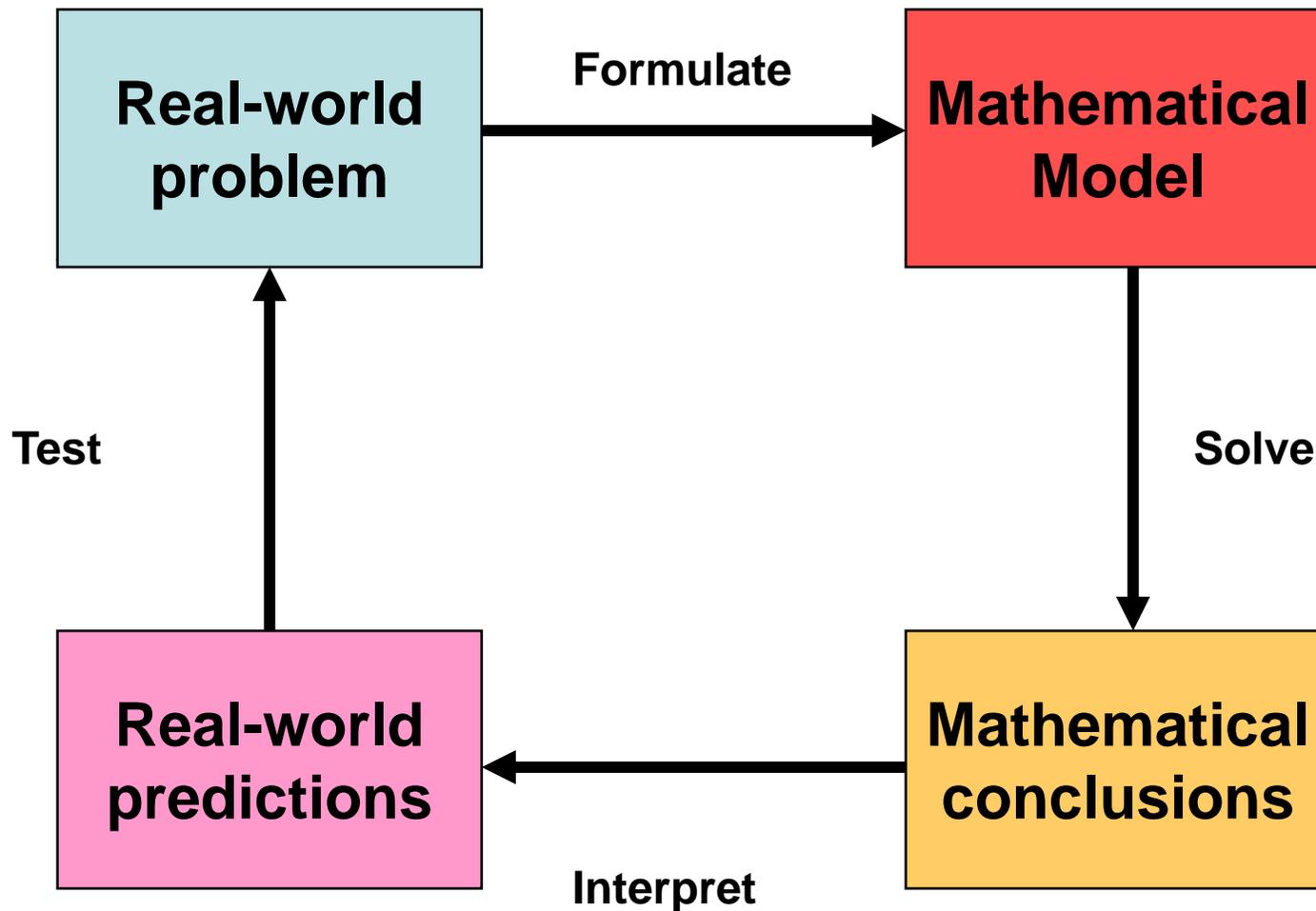
See p360 and A34, Sigma Notation in Stewart



$$\sum_{i=m}^n a_i = a_m + a_{m+1} + a_{m+2} + \cdots + a_{n-1} + a_n$$

# Modeling Process

Page 24, Stewart



# Lesson Link

## Estimations



The West Point parade field is always kept lush and green.

Consider the sprinkler system that is located below the surface. How much piping is required to have complete coverage to maintain the parade field?

Set up this problem and provide an estimate. What information do you need? What information can you calculate? What assumptions should you make?

<http://emp.byui.edu/blaylockb/Power%20Point%20Presentations/Lect%204%20Estimating%20Math/sld001.htm>