

“The essential and characterizing properties of mathematics, which enable it when properly taught, to make unique and indispensable contributions to the education of all youth, are that it is exact, abstract and logically structured” –Frank Allen

**Thus we study math to train the brain –NOT because it is useful in the supermarket.**

1. Introduction. See Math 3131 course page. (Put “pennance” in GOOGLE to find page.)
    - (a) Syllabus
    - (b) Course Notes
    - (c) Bibliography
    - (d) Office hours
    - (e) Exams
    - (f) etc.
  2. Mathematical Fundamentals
- (f) Examples of good and bad definitions.
  - (g) Axioms and primitive concepts.
3. Remarks on the nature and importance of abstraction.
  4. Abstraction (roughly speaking) is the study of those properties which sets have in common.
  5. Abstraction as a goal in teaching



Aristotle

- (a) Aristotle
  - (b) Logic – the art of reasoning.
  - (c) Definition – the first part of logic.
  - (d) Definition of a species *per genus proximus et differentia specifica*
  - (e) Definition in mathematics and some examples.
- (a) When we teach of three stones, three sheep, etc our aim is to teach the abstract concept of 3.
  - (b) When we teach about the northern hemisphere our goal is that the student understand all hemispheres.
  - (c) When we teach special words “mama”, “papa”, “cada” our goal is that the student learns all similar words.
  - (d) When we solve equations such as  $3 \times 4 = x$ , our aim is to teach all such equations.