Biology II Review

Basics for Biology

1.1 Themes of Biology

- *Biology* is the study of all things living.
- What does it mean to be living?
  - *Organization*: All *organisms* have organization in their structure.
    - Ex. Cells, Tissues, Organs, Organ Systems
    - Unicellular vs. Multicellular

1.1 Themes of Biology

- What does it mean to be living?
  - *Reproduction* (species)
    - All living things reproduce with their own kind to produce more of their own kind
    - Asexual vs. Sexual Reproduction
    - Mommy + Daddy = Baby

1.1 Themes of Biology

- What does it mean to be living?
  - It is called *homeostasis* when an animal regulates its internal environment because of external or internal factors.
    - *Stimulus* and *Response*
      - The stimulus is what happens, while the response is how an organism reacts to that situation, whether voluntarily or not.

1.1 Themes of Biology

- Evolution
  - *Adaptation* from previous generations
    - Adaptations are genetic changes in an organism that are passed on to their offspring.
    - Populations of organisms evolve- not individuals!
      - Ex. Duck's webbed feet
      - The enormous human brain
  - *Natural Selection*
    - As proposed by Darwin
    - "Survival of the Fittest"

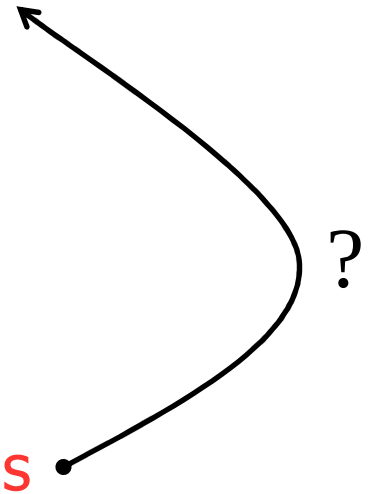
1.2 The World of Biology

- What does it mean to be living?
  - *Growth (cell division)*
    - Living things often grow throughout their lives.
      - Ex. I was 5’2” and now I’m 5’4”!
      - An alligator grows its whole life.
  - *Development*
    - Living things develop within their lives.
      - Pupa to butterfly
      - Puberty
      - No change in size, in fact can get *smaller*

1.3 Scientific Methods

Scientific Method

1. Observation & Study
2. Hypothesis
3. Experiment
4. Data
5. Results & Conclusions
6. Theory



1.3 Scientific Methods

- *The Scientific Method*: The steps that scientists use to gather information and answer questions.
  - Anyone who does this properly can be considered a scientist!
    - The Ordones

1.3 Scientific Methods

- An explanation for something that can be tested is called a *hypothesis*.
  - A good definition is *an educated guess*.
  - "I think my fish are dying because I haven't cleaned their tank."
  - "A brown tree snake is killing all of our birds!" (p. 12)
  - "I think the earth revolves around the sun." (Copernicus)
  - *Inference*: logical interpretation based on prior knowledge
    - "At 1:12 PM Old Faithful will erupt again."

1.3 Scientific Methods

- *Experiment*: A series of steps that test the hypothesis by collecting specific information.
  - Experiments are important in testing a hypothesis.

1.3 Scientific Methods - Experiment

- *Control or Control Group*: the group in the experiments in which everything is kept the same.
  - Done so that scientists can know exactly what would have happened if they didn't do anything to their test subject.
  - *Experimental Group*: subjected to experimental procedure

1.3 Scientific Methods - Experiment

- *Independent Variable*: The independent variable is changed *by the scientist*.
  - Ex. Give some plants water and others bleach, and yet another group Miracle Gro©. The independent variable is what the scientist is changing in the experiment- do the plants get water? Bleach? Miracle Gro©?
  - On a graph, the X axis

1.3 Scientific Methods - Experiment

- *Dependent Variable*: The dependent variable changes on its own.
  - Ex. How much did the plants grow that were given water? How about bleach?
  - How much they grew would be a dependent variable.
  - How long they lived during the experiment would also be a dependent variable.
  - Y axis on a graph

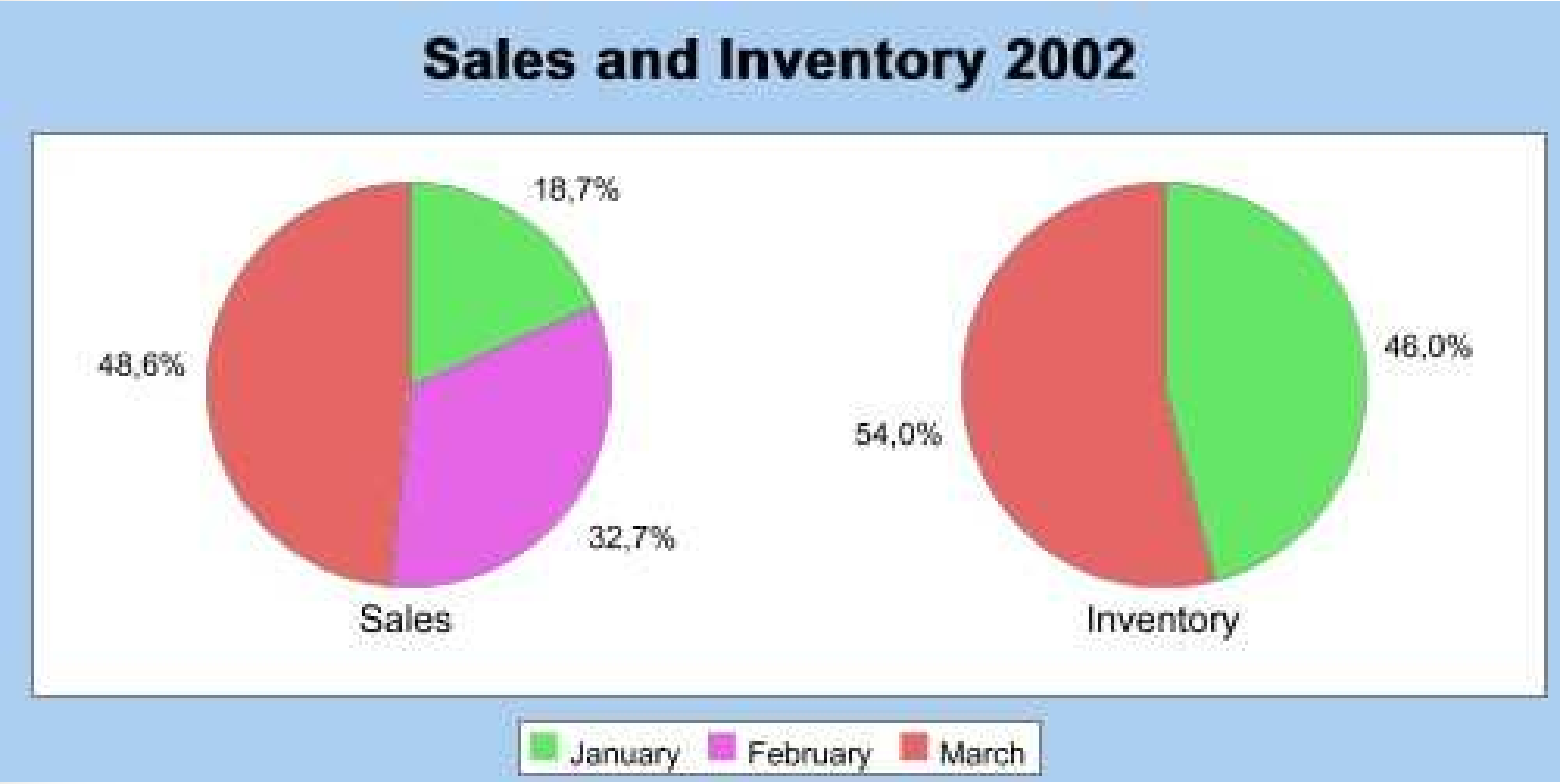
1.3 Scientific Methods

- A *theory* is a hypothesis that has been supported by many scientists over and over again over a long period of time.
  - A scientific theory is very different from a theory in everyday life!
  - Some Scientific Theories:
    - Theory of DNA Structure (Watson and Crick)
    - Theory of a Round Earth (Ancient Egyptians)
    - Heliocentric Theory (Copernicus)
    - Theory of Evolution of Species (Darwin)
    - Theory of Relativity (Einstein)

1.3 Scientific Methods

- *Quantitative Research*: Research that provides a scientist with concrete numbers or numerical data.
  - It is common to produce a graph or a table from this type of research.
  - Quant. Research is done using "SI" measurements- all in the metric system.
    - International System of Measurement
    - Meters, centimeters, etc.

Charts and Graphs



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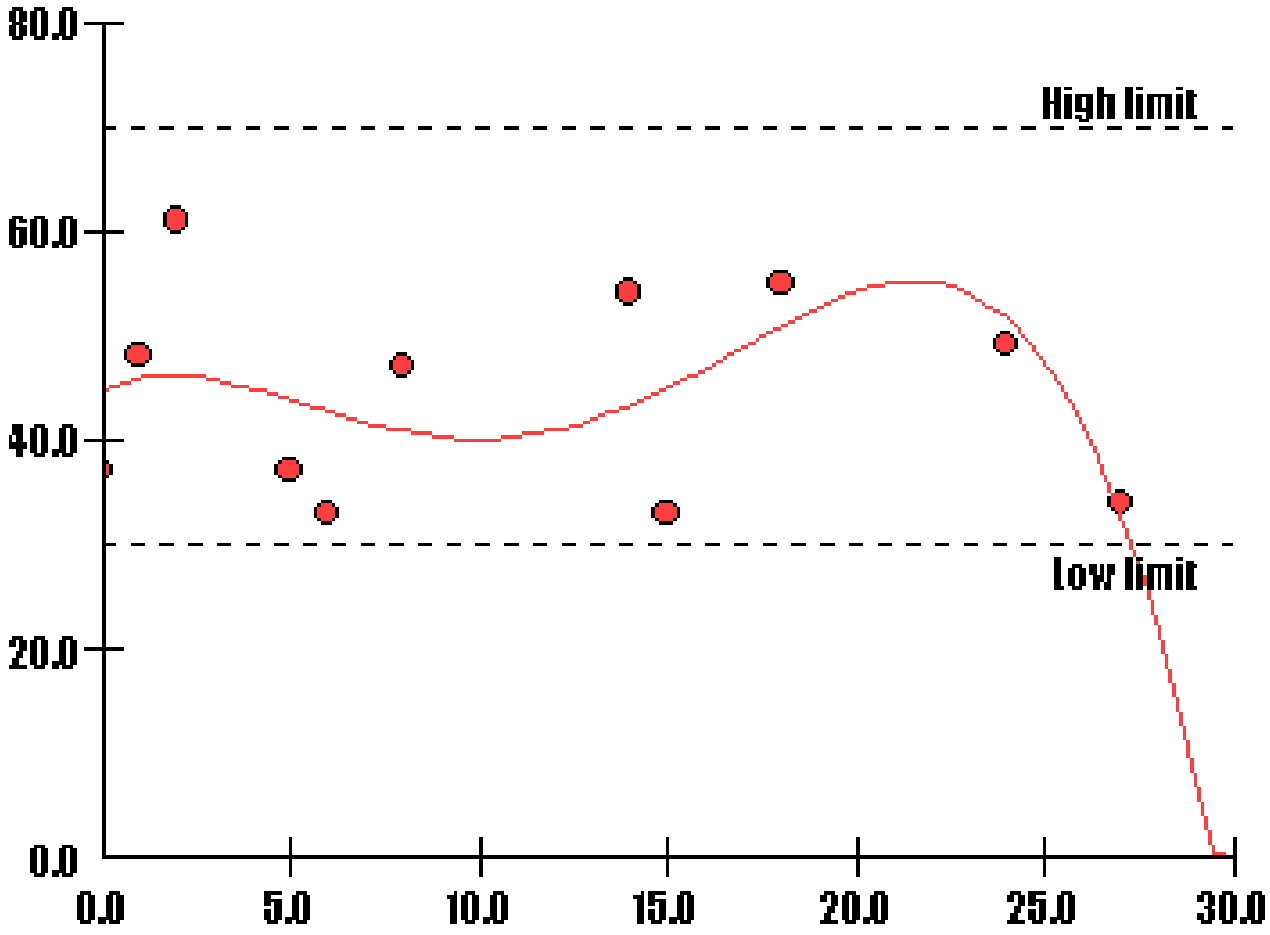

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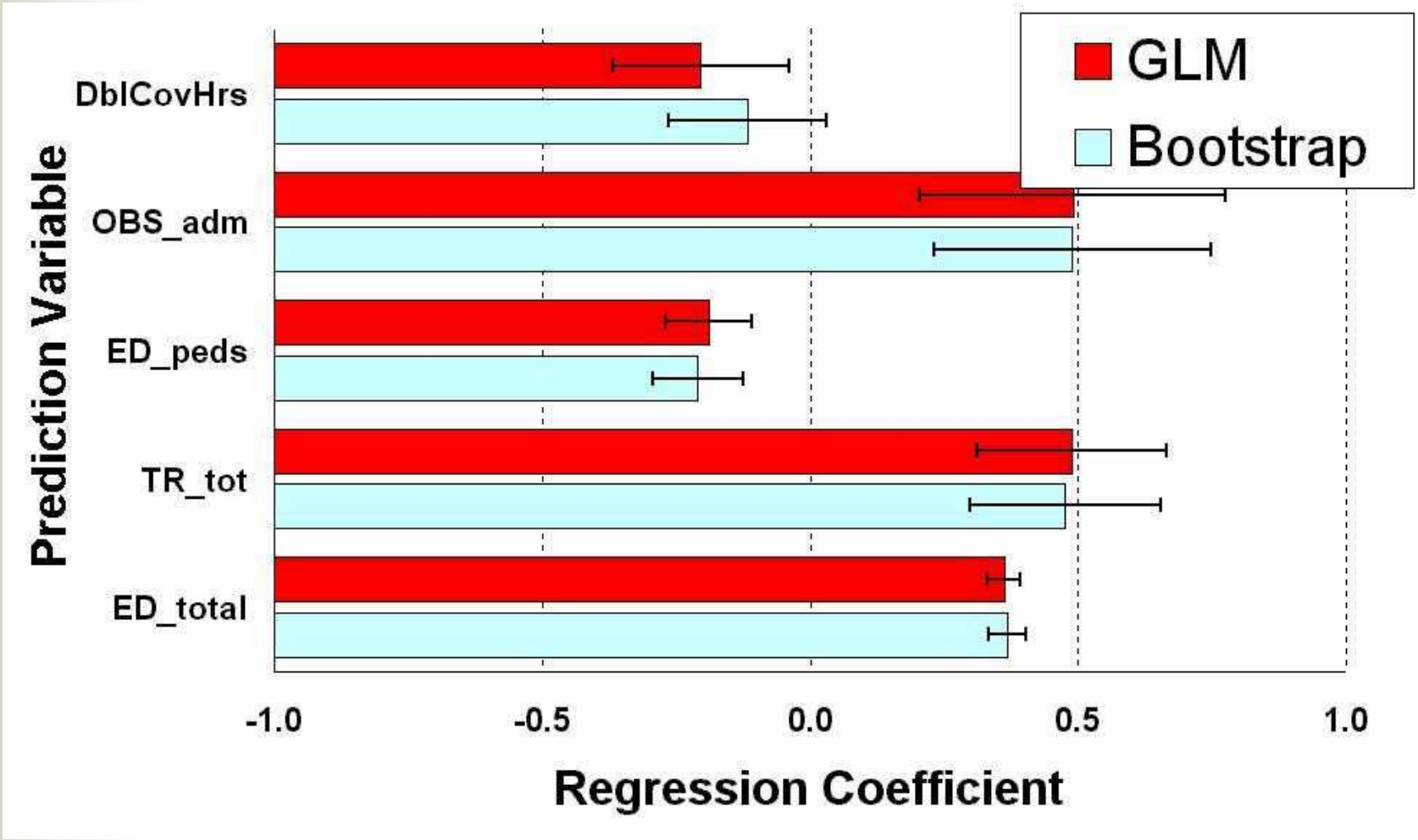

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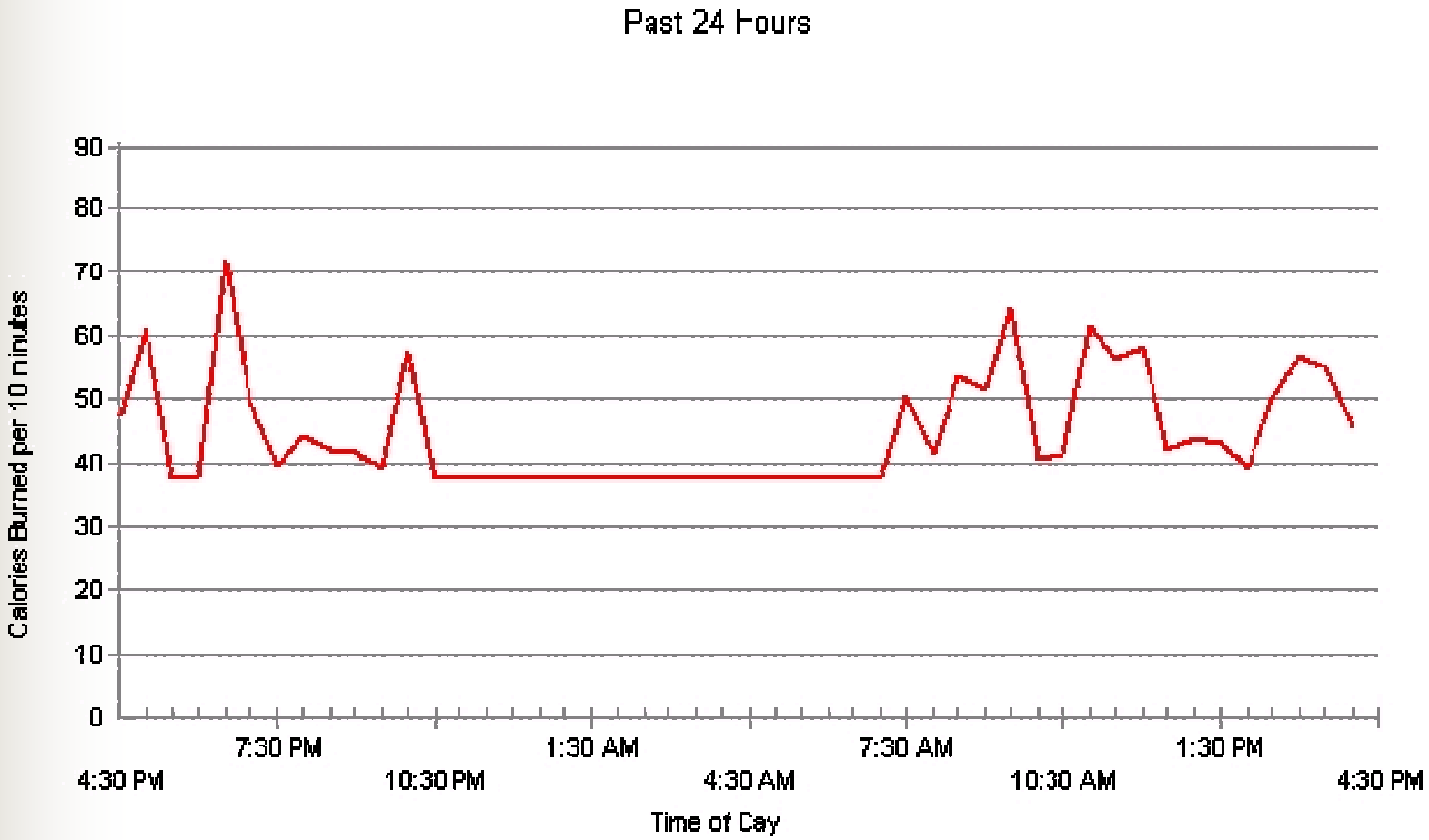

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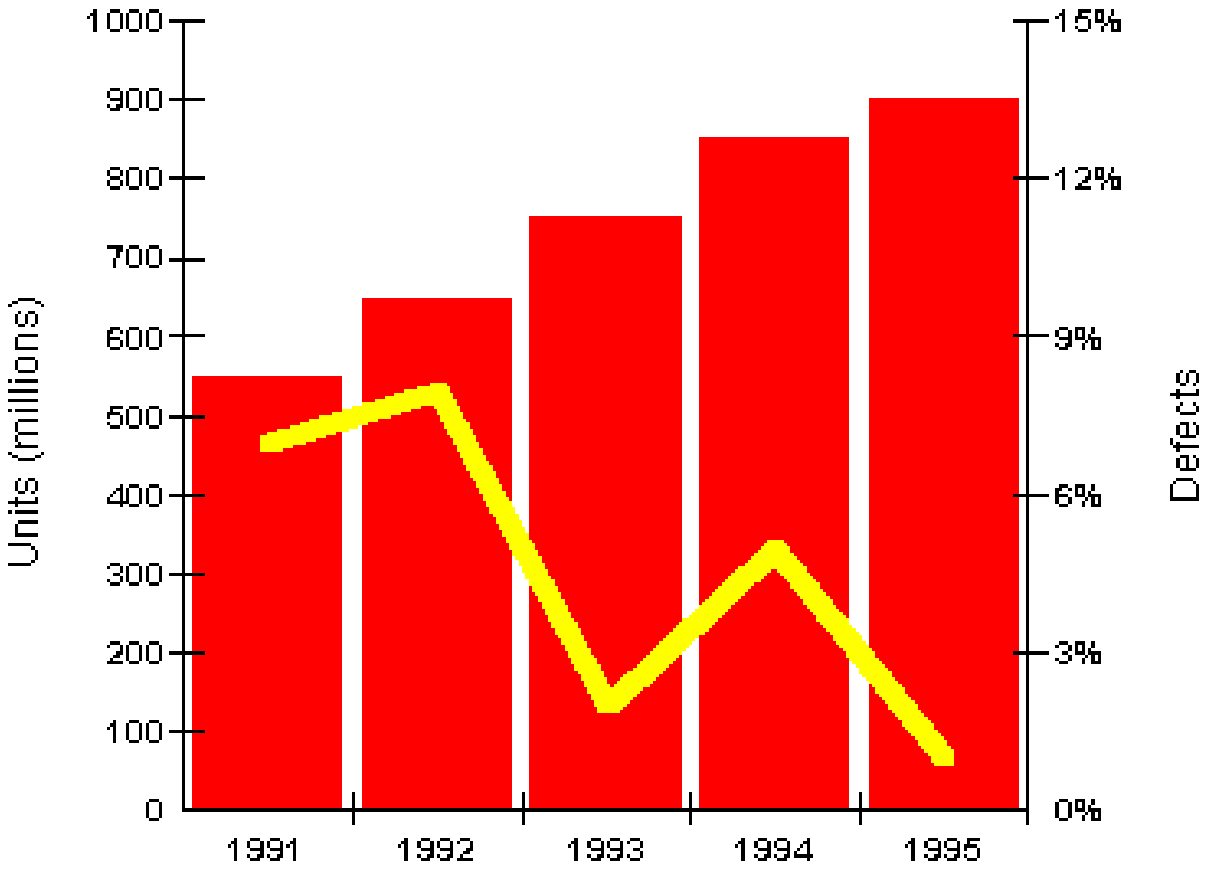

1.3 Scientific Methods

- *Descriptive Research*: Research that will not produce numerical data.
  - Ex. "After four hours, the ape seemed to calm down a lot. After several hours he was actually asleep."
  - Impossible to make graphs or charts from this type of data.