

CPS 5310 Spring 2015 Mathematical and Computer Modeling
Shirley Moore, Instructor
January 20 Class
Group Exercise

Brainstorming Exercise: Modeling and Simulation Concepts

Course website: <http://svmoore.pbworks.com/>

For each of the questions 1 through 5, answer as best you can with your current knowledge. After you have read Velten Chapter 1, revise your answers and bring your written revised answers to class on January 22.

In preparation for the next class, please also install the book software on your computer if you have one you can bring to class. Please also do the assigned reading before class and look over the materials on the course website for that class.

1. What is a mathematical model?
2. What types of models exist?
3. How does one determine which model is appropriate for a particular problem?
4. How does one set up a mathematical model?
5. Give definitions or descriptions of the following terms:
 - a. simulation
 - b. parameter estimation
 - c. validation
6. Class discussion: For each of the following statements, say whether you agree or disagree (and be prepared to explain your reason(s)):
 - a. A good model is one that mimics the part of reality to which it pertains as closely as possible.
 - b. The best model is one that is as simple as possible while still allowing us to understand a system well enough to answer the question at hand.
 - c. We should know the purpose of a model before we start to create it – i.e., modeling should be purpose-drive, or *teleological*.
 - d. Mathematical modeling and simulation of a problem make physical experimentation superfluous.
 - e. The formulation of a mathematical model is separate from the computer solution of the mathematical problems posed by the model.
 - f. To do modeling and simulation, you must be an expert mathematician.