

Welcome to Mathematical Modeling! Math 231

Homework: Read pages 1-8
Do exercises 1-3 on p 7
Read ahead p. 9-10

1. Why Study Mathematical Modeling?

- we use mathematical models every day in almost all disciplines...
- Chemistry: Ideal gas law.
- Physics: $F=ma$, $E=mc^2$, Life and Death of Stars
- Economics: Effects of The Economic stimulus, Stock Market
- LAW: Drug Rehab vs Imprisonment
- Government: Regulations and Traffic Flow
- Biology: Neuroscience, Cancer Research, Blood Clots
- Environmental studies: Fire Spread, Endangered Species, Pollution, Global Warming.

Even in every day life:

A spread sheet to analyze your finances.
Video games
Writing a schedule

Pick your favorite Subject:

Do this when you choose subjects for your final project.

GOOGLE: Mathematical Models

- If you find good articles ... send them to me, I will post them on 'blackboard. !!

math models are important and used everyday ... now ...

2. What is a Mathematical Model?

Tony Starfield: "A model is a purposefull representation"

- A model is anything That logically represents the world around us with the goal of better understanding the thing being modeled.
1. It should be usefull and informative
 - Always start with a clear question that you are trying to answer
 2. It should represent the system being modeled
 - Be as accurate as possible within your limitations - always list your assumptions clearly
 3. It is a way of thinking about the world around us.
 - Learning math modeling will change how you approach the world around you
 - It's all about solving problems in a clear and logical way and being able to communicate your solutions to others.

3. What constitutes a good Model? It depends...

Always need:

- A clear list of assumptions
- A clear list of questions being answered

But really ... the "goodness" of a model depends on the system being modeled, the resources available, and the question being asked.

EX A map is a type of Model ... but there are lots of different types of maps.

★★ NAME SOME TYPES OF MAPS:

- Hand drawn map from here to T.J.
- US road Map
- World Globe
- Map of the Stars
- Redlands City Map
- Topo Map

These are all models of the world around us ...

Which is BEST ... depends of the question being asked and the resources available!!

How do I get to Trader Joes?

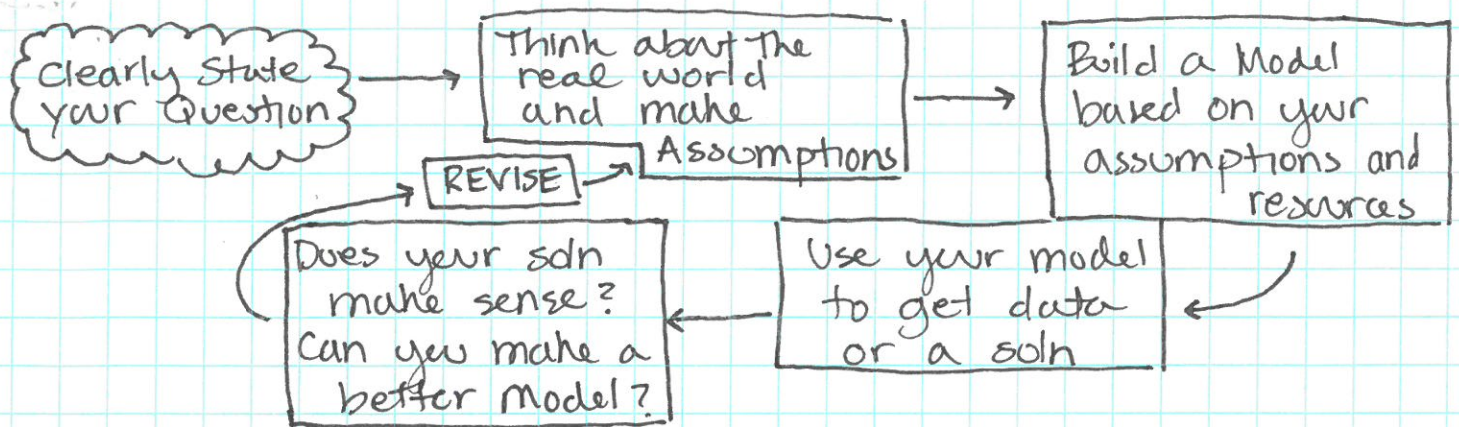
How do I get to Twin Falls, ID?

How much elevation would I gain while climbing Mt. Everest?

Also keep in mind The amount of accuracy needed ... and what your resources are.

Math Modeling is a process - it will require participation in and out of class

START SIMPLE ... Refine, Refine, Refine



Problems are often ill stated or messy...

THERE IS NOT ONE RIGHT ANSWER
THERE IS MORE THAN ONE RIGHT APPROACH
BRAINSTORMING AND REFINEMENT ARE KEY

OK - lets build our first model... Use this process in future projects.

The QUESTION: How many ~~unpopped balloons~~ ~~unsquished ping-pong balls~~ would it take to fill the classroom?

60 SECONDS... Write down your individual estimate!

Burst out some Ideas.

- What were your resources?
- Did you make any assumptions?
- What issues were in your way?

IN GROUPS - 5 MINUTES - Readdress the problem come up w/ a new estimate.

Brainstorm

- What are some good Assumptions to start with?

HAND OUT PROJECT 1. - ASSIGN GROUPS

★ LAB TOMORROW / REST OF CLASS TODAY

Then start The modeling...

- Measure Room
- Come up with a clear list of assumptions
- Come up with questions for Thursday.