Mathematical Modeling – MAT 506/606
Fall 2013
Homework 1

Due date: August 28, 2013

1. *(6 points)* Identify at least two possible variables and two parameters involved in each of the following models. Clearly identify which is a variable and which is a parameter.

(a) A biologist wants to model the population of foxes and rabbits in a forest over a period of time.

(b) A public health researcher wants to model the amount of alcohol in the bloodstream of a college student during an evening of partying.

2. *(6 points)* A cashier at a supermarket can checkout, on average, 3 customers a minute (this is called the service rate). Customers arrive, on average, 2 a minute (this is called the arrival rate). The manager figures that since the service rate is greater than the arrival rate, customers will never have to wait in line. What assumptions are the manager making? Do these assumptions seem reasonable? What does this say about the validity of the conclusion?

3. *(6 points)* **[Graduate]** A college student plans to ask 100 different girls for a date. He calculates the number who will say yes with the following reasoning:

Since every girl can say yes or no, exactly half will say yes. Since half of 100 is 50, exactly 50 girls will say yes.

What, if anything, is faulty with this model? Explain.

4. *(2 points)* **[Graduate]** Identify at least one type of assumption behind the model used in the following situation.

A cooking magazine lists one ingredient for a recipe as 1-2 cups of shredded cheddar cheese. It then claims that each serving has 320 calories.