OPTIMAL AUCTION BIDDING

For this modeling challenge, you are asked to consider a simple auction of an item whose intrinsic value is \$100. You are bidding against a single opponent, and you are willing to assume that her bid will be at least x with probability $e^{-\lambda x}$, for some positive value of the parameter λ. Clearly you'd like to bid more than your opponent, in order to obtain the item, but you'd like to bid as low as possible, in order to achieve the highest possible profit. Describe a procedure that will allow you to determine your optimal bid amount in terms of λ. How will this change if you were facing more than one opponent who independently bids with the same probability?

- Define variables that capture the important components of the situation.
- Set up equations to describe the desired relationship between the variables you have defined.
- Describe how to solve the equations you set up. This may include complete analytic solutions, or approximation, when necessary, or even computer simulations and graphs.
- Interpret the solutions you obtained in the context of the original situation.
- Describe the limits of applicability of the model you constructed and discuss improvements to your model, which would help address some of these shortcomings. You don't have to implement any of these suggestions.