Handout 1, August 21

Suppose we are trying to estimate what proportion of NCSU Statistics alumni will order a new department t-shirt to help raise money. Before we contact any of the alumni, we think that the proportion will be about 5%, and we'd be very surprised if the proportion were as high as 15%. We randomly sample alumni and find that 14 of the 120 we talk to indicate that they would be willing to buy a t-shirt.

1. What inference do we make about the proportion?

2. If we are working in a classical/frequentist framework, what do we do with the information that "we think the proportion will be about 5%, and we'd be very surprised if the proportion were as high as 15%"?

3. Suppose that we are specifying a Bayesian model, and we want to use a beta distribution to specify a prior about the proportion of alumni (p) who will buy t-shirts. What might we do with the information?

We apply *Bayes Theorem* to use the data we've collected to update our "pre-data" information about the parameter to "posterior" information about the parameter.

$$\pi(\theta \,|\, \mathbf{y}) = \frac{f(\mathbf{y} \,|\, \theta)\pi(\theta)}{f(\mathbf{y})}$$