Agenda

1. Inference for a single numerical mean

Warmup: Gifted Children An investigator is interested in understanding the relationship, if any, between the analytical skills of young gifted children and the following variables: father's IQ, mother's IQ, average number of hours per week the child watched an educational program on TV during the past three months, average number of hours per week the child watched cartoons on TV during the past three months. The analytical skills are evaluated using a standard testing procedure. Data were collected from schools in a large city on a set of 36 children who were identified as gifted children soon after they reached the age of four.

For 25 of the 36 children, the child's mother's IQ was higher than that of the father. Find a 95% confidence interval for the true proportion of gifted children whose mothers have higher IQs than their fathers.

Inference for a Mean We know how to make inferences about the value of a population proportion p, for a binary variable. The critical step was to construct an approximation of the sampling distribution of the sample proportion, $\hat{p}$. What if the the variable that we want to make inferences about is *numerical*? In this case we need to approximate the sampling distribution of the sample mean, $\bar{x}$. How can we do this?

Gifted Children's scores Use the information presented below to construct a 95% confidence interval for the mean analytical score among gifted children.

```
require(openintro)
require(mosaic)
favstats(~score, data = gifted)

##  min  Q1 median  Q3 max     mean       sd  n missing
##  150 155    159 162 169 159.1389 4.630043 36       0
```

1. Compute the standard error of the mean.

2. Find the appropriate critical value in the appropriate t-distribution. [Use the `qt` function in R.]

3. Write down the confidence interval.

4. Assume that the standard deviation presented above was actually the standard deviation of the scores in the whole population. Compute the confidence interval again, and compare the new interval to the one you found previously (using the t-distribution). Are they importantly different?

Inference for Paired Data: Gifted Children's Parents Since in this data set, the IQ of both parents is recorded for all children, the IQ data is naturally paired.

1. Find a 90% confidence interval for the mean IQ of the mothers. Do the same for the fathers. Do they overlap?

2. Test the hypothesis that the mothers of gifted children have higher IQs, on average, than the fathers. Write out all of the steps. What do you conclude?