Hypothesis Testing

Grinnell College

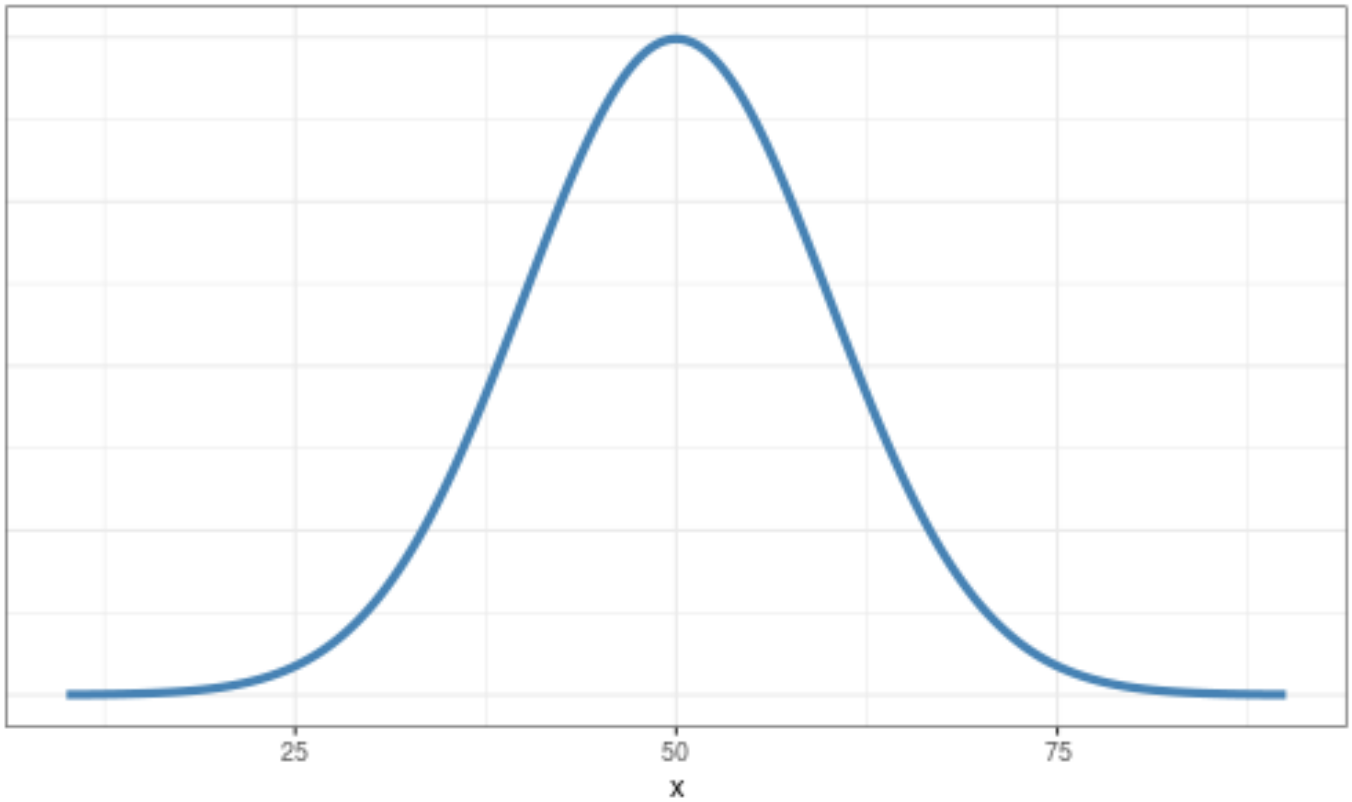
March 11, 2024

Review

1. Up to this point, we have focused on taking data that we have collected and computing statistics:
   - $\overline{x}$
   - $\hat{\sigma}$ and $\hat{\sigma}/\sqrt{n}$
2. Using our *statistics* and what we know about *sampling distributions*, we have been able to construct ranges of plausible values for population *parameters*
3. We are now going to use these tools for **hypothesis testing**

Distribution of Population

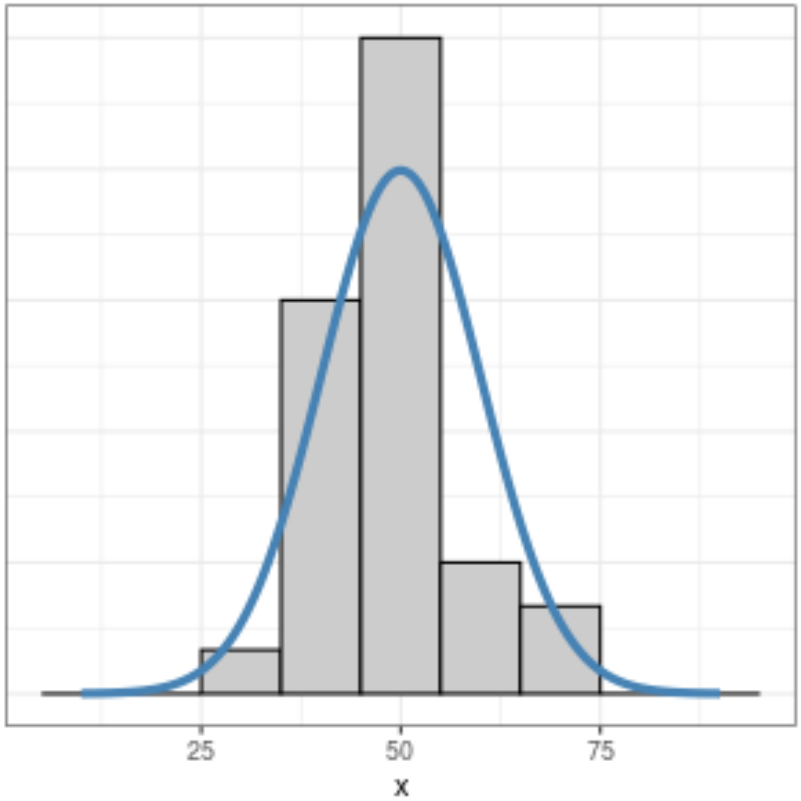
$$N(\mu = 50, \sigma = 10)$$



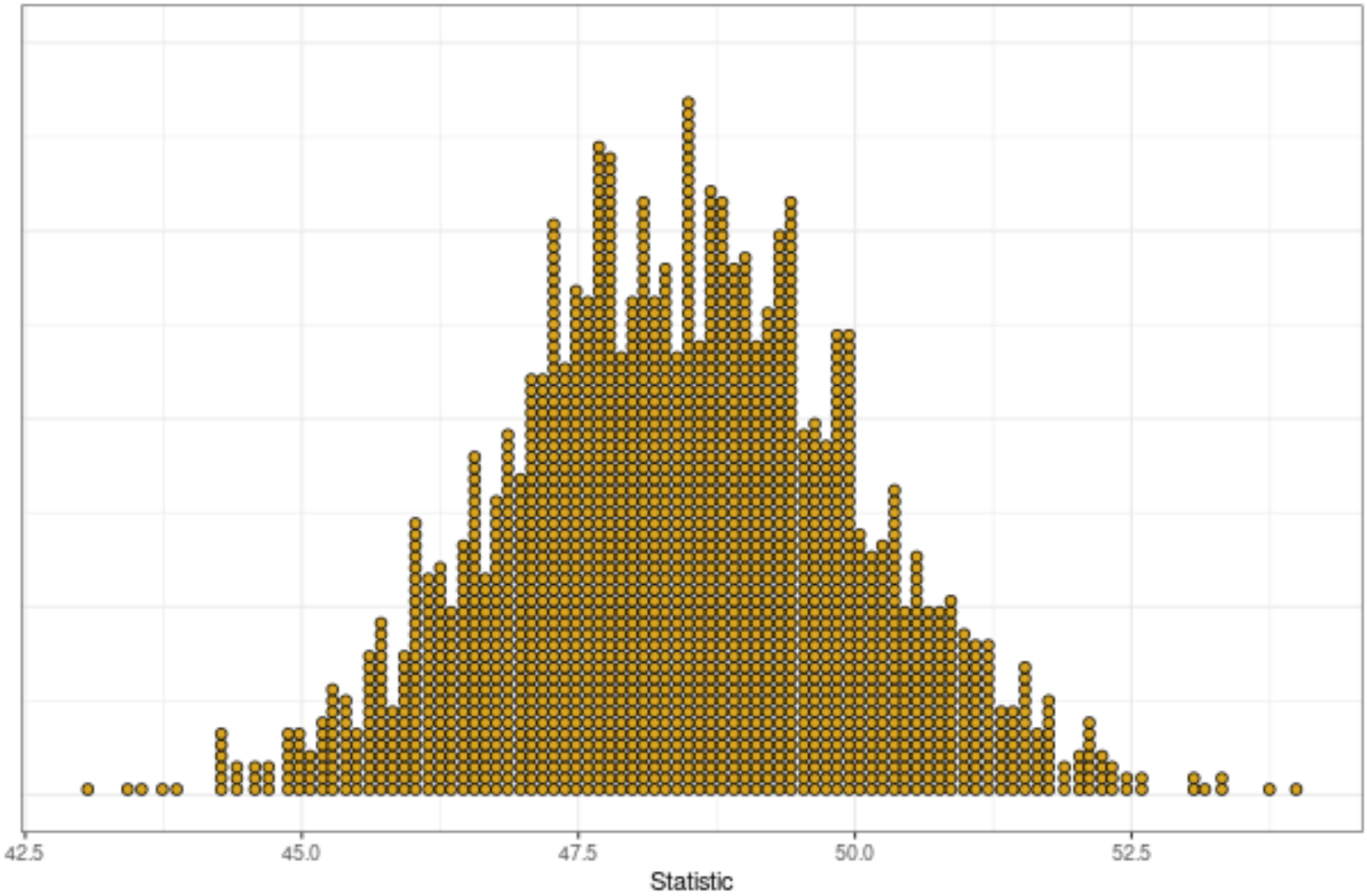
Single Sample

Sample Details:

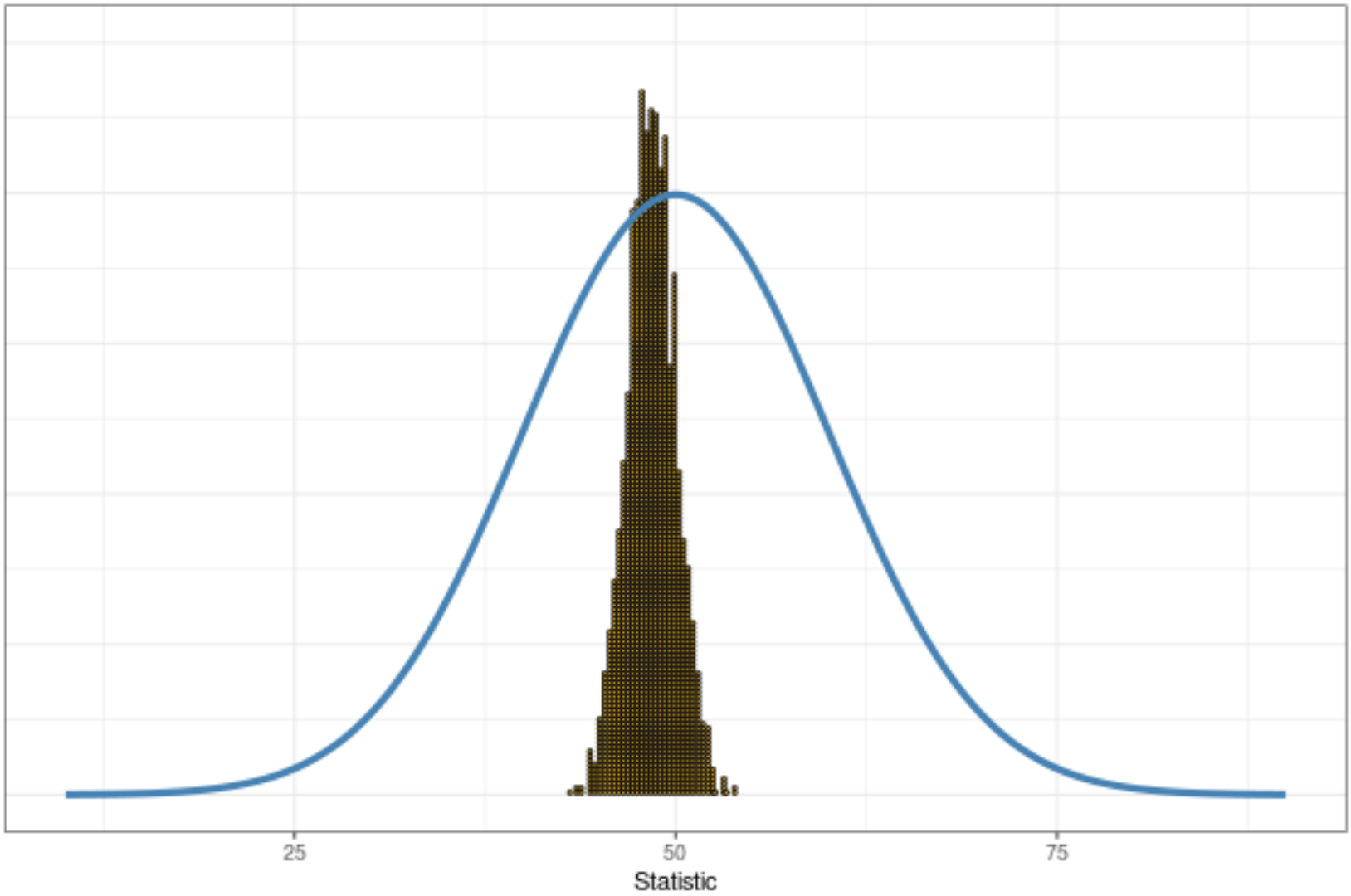
- Drawn from $N(50, 10)$
- $n = 30$
- $\overline{x} = 48.48$
- $\hat{\sigma} = 8.77$



Sample Distribution



Sampling Distribution

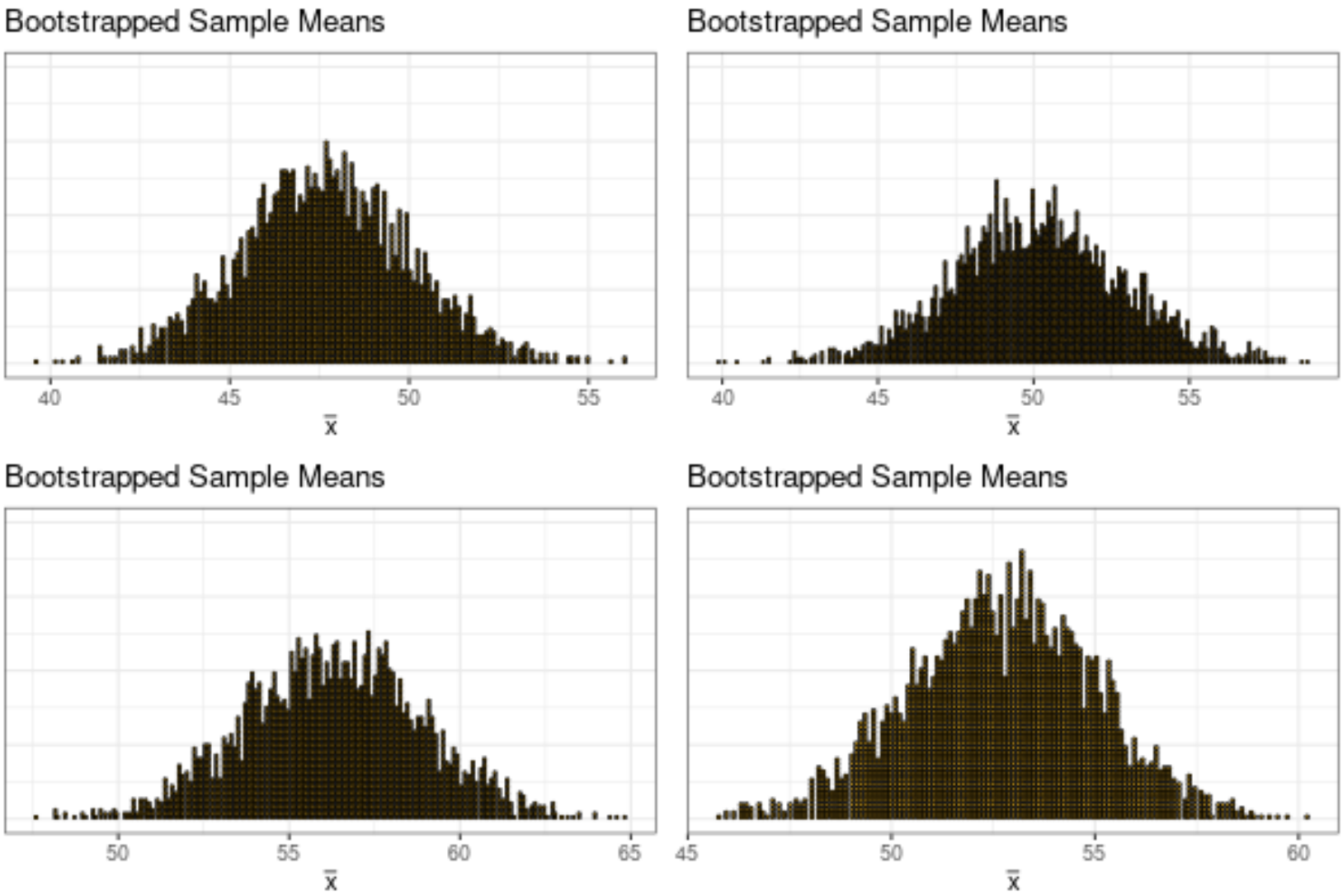


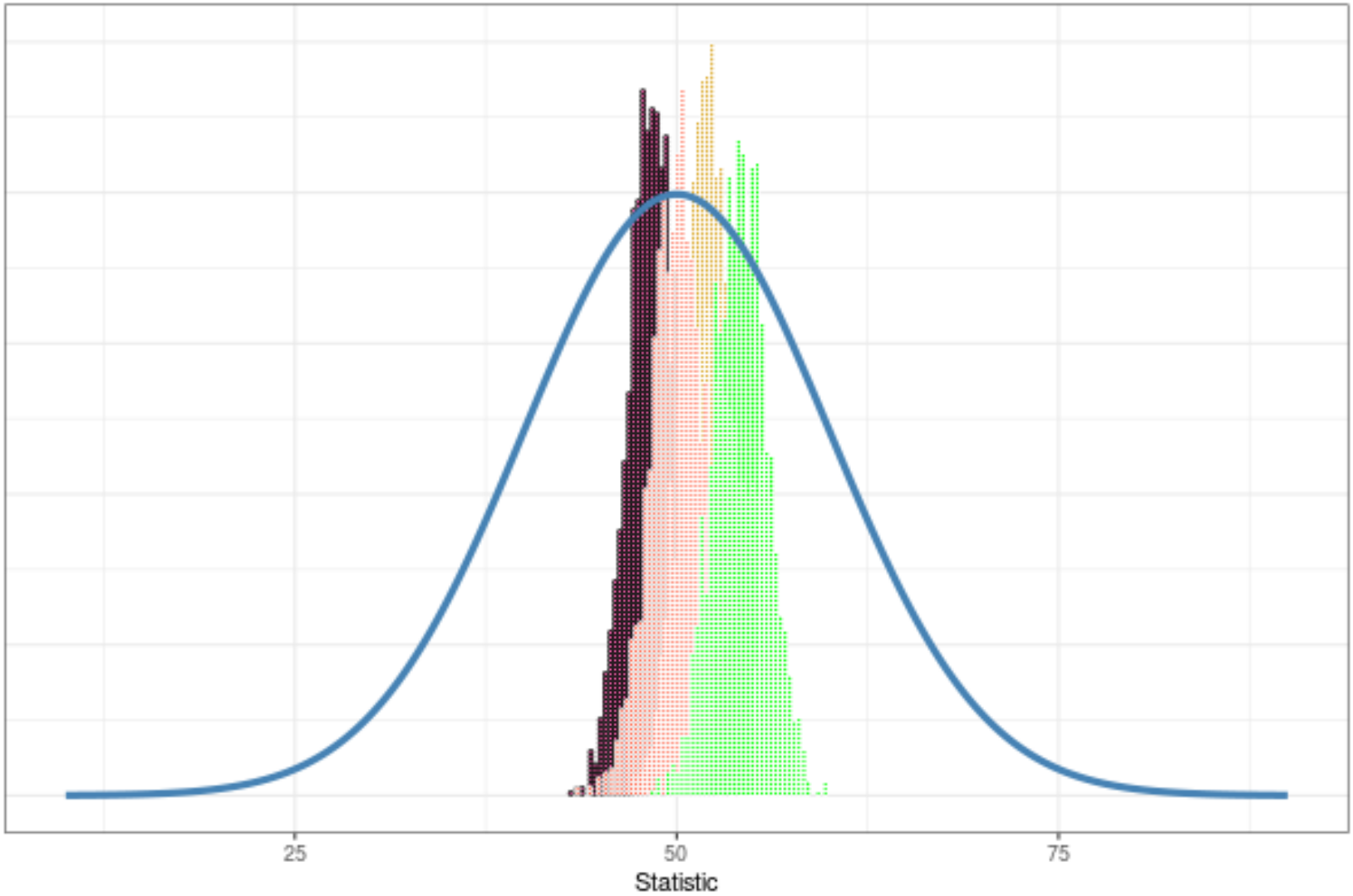
More Samples

What if we collect samples (not bootstrap) from our normal population 4 more times

Sample	n	$\overline{x}$	$\hat{\sigma}$
1	30	47.73	13.15
2	30	50.26	15.34
3	30	56.35	14.07
4	30	52.83	12.77

More Bootstrap Sampling Distributions




25
50
75
Statistic