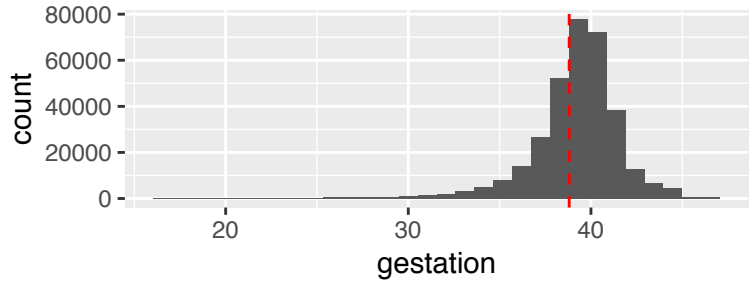
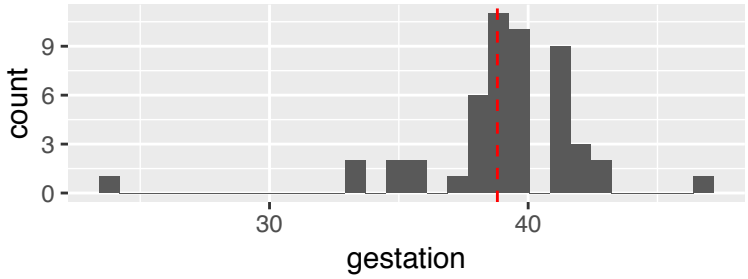
Population: 330,717 babies
mean 38.8 weeks, sd 2.61 weeks



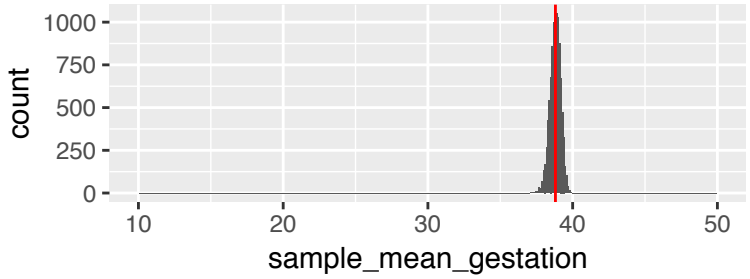
Draw 1 Sample

Draw Many Samples

Sample: 50 babies
mean 39.08 weeks, sd 3.28 weeks



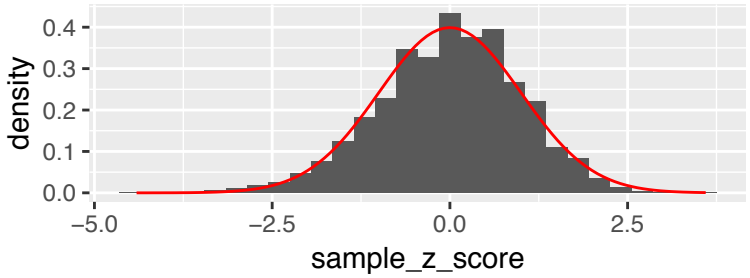
Sample Means from 10000 samples
Each sample of size n = 30



$$z\text{-score} = \frac{\bar{Y} - \mu}{\sigma/\sqrt{n}} = \frac{39.08 - 38.8}{2.61/\sqrt{50}} \sim \textbf{Normal}(0,1)$$

The standard deviation of values in the population.
In real life we almost never know this!

Sample Z–scores from 10000 samples
Each sample of size n = 50



$$t = \frac{\bar{Y} - \mu}{s/\sqrt{n}} = \frac{39.08 - 38.8}{3.28/\sqrt{50}} \sim t_{49}$$

The standard deviation of values in the sample.
The best we can do without measuring everyone in the population!

Sample t statistics from 10000 samples
Each sample of size n = 50