

M339G: January 16th, 2026.

What if the sample is not normal?

Still, say,
estimating μ

How do you triage?

• diagnostics

eyeballing

- histogram
- box plot
- q-q plots
- Shapiro-Wilk Test

need more, e.g.,
Laplace, triangular \sim

- symmetry and unimodality
- symmetry and outlier
- speak to normality

What if normality fails?

→ Sufficiently large data sets \Rightarrow CLT

$\Rightarrow \begin{cases} Z\text{-procedures} \\ t\text{-procedures} \end{cases}$

→ **Bootstrap**

Data Set:

x_1, \dots, x_n

Draw with replacement

B...the # of
resamplings

$\bar{x}_1, \bar{x}_2, \dots, \bar{x}_B$

Create a confidence interval,
e.g., 2SE or quantile.

e.g.,

$$x_1 = 1$$

$$x_2 = 3$$

$$x_3 = -4$$

$$B = 4$$

$$\begin{matrix} b=1: & 3, 1, 3 \\ \vdots & \\ b=4 & \end{matrix} \Rightarrow$$

$$\begin{matrix} \bar{x}_1 = \frac{7}{3} \\ \vdots \\ \bar{x}_4 = \dots \end{matrix}$$