3 Questions (well, 3.5) will determine which inference procedure is correct for a given problem.

1. Is this a mean problem (quantitative data) or a proportion problem (categorical data)?

2. If it is a mean problem, is \( \sigma \) known or unknown?

3. Is there 1 group (sample), or two?

4. Is it a hypothesis test or a confidence interval?

(The next slides spell out the options.)
Mean Problem - $\sigma$ unknown
(quantitative data)

- One sample or two samples?

1-sample

Hyp. Test or C.I.?

\[ t = \frac{\bar{x} - \mu}{SE(\bar{x})} \]

C.I.

\[ \bar{x} \pm t^* SE(\bar{x}) \]

2-sample

Hyp. Test or C.I.?

Hyp. Test

\[ t = \frac{\bar{x}_1 - \bar{x}_2}{SE(\bar{x}_1 - \bar{x}_2)} \]

C.I.

\[ \bar{x}_1 - \bar{x}_2 \pm t^* SE(\bar{x}_1 - \bar{x}_2) \]
Mean Problem - $\sigma$ known
(quantitative data)

- Sample
  - One sample or two samples?
    - Hyp. Test or C.I.?
      - Hyp. Test
        - $Z = \frac{\bar{X} - \mu}{s(\bar{X})}$
      - C.I.
        - $\bar{X} \pm z^* s(\bar{X})$
    - Z-sample
      - Hyp. Test or C.I.?
        - Hyp. Test
          - $Z = \frac{\bar{X}_1 - \bar{X}_2}{s(\bar{X}_1 - \bar{X}_2)}$
        - C.I.
          - $\bar{X}_1 - \bar{X}_2 \pm z^* s(\bar{X}_1 - \bar{X}_2)$
Proportion Problem (categorical data)

One sample or two samples?

Hyp. Test or C.I.?

Hyp. Test

\[ z = \frac{\hat{p} - p_0}{SE(\hat{p})} \]

\[ \hat{p} \pm z^*SE(\hat{p}) \]  
\[ (\hat{p} = \text{plus 4 estimate}) \]

C.I.

C.I.

Hyp. Test

\[ z = \frac{\hat{p}_1 - \hat{p}_2}{SE(\hat{p})} \]

\[ \hat{p}_1 - \hat{p}_2 \pm z^*SE(\hat{p}_1 - \hat{p}_2) \]  
\[ (\hat{p}_1 = \text{plus 4 estimate}) \]