Is a 2.9% diff. between data & theory sufficient to matter? Rough rule of thumb: 20% of tests are 10% incorrect. Is the difference between 25.0°C & 24.2°C (theoretical mean) practically significant? (1.7°C is 6.9°C in biological terms.)
Relative difference smaller than 5% can still be precise if they accumulate over time.

Intertidal crabs

Sample

The observed crabs inferred

\[ e.\text{temp.} \]

\[ \begin{array}{l}
25.8 \\
25.4 \\
\end{array} \]

\( h = 25 \)

\[ \text{mean } \gamma = 25.0 \%
\]

\[ SD \ s = 1.34 \%
\]

Sample hist

Hist.

To specify pop., answer this: what is the broadest scope of valid generalizability outward from the sample dataset?
The document contains handwritten notes on statistical concepts and methods. Here is a transcription:

1. **Hypothesis Testing**
   - Sample: Specific, particular
   - Null hypothesis: Unknown
   - A known probability
   - Random variable: IID
   - General: Deductive reasoning
   - Particular: Inductive reasoning
   - Statistics: Inferential summary
   - Sample mean: \( \bar{y} = 25.0^\circ C \)
   - Estimate of \( \mu \): \( \bar{y} = 25.0^\circ C \)
   - Standard error: \( SE(\bar{y}) = \frac{5}{\sqrt{50}} = 0.27^\circ C \)
   - 95% confidence interval: \( \bar{y} \pm (2.04)(0.27^\circ C) = (24.4^\circ C, 25.6^\circ C) \)

2. **Statistics**
   - Sample mean: \( \bar{y} = 25.0^\circ C \)
   - Known parameter: \( \mu \)
   - General: Deductive reasoning
   - Particular: Inductive reasoning
   - IID: (harder)
   - Known: (easier)

3. **Inference**
   - Sample: Particular, specific
   - Unknown: General
   - Known: Particular, specific
   - IID: (harder)
   - Known: (easier)

4. **Conclusions**
   - 95% confidence interval: \( (25.0^\circ C - 0.5^\circ C, 25.0^\circ C + 0.5^\circ C) \)
\[ \hat{SE} = 0.27 \text{ }^\circ C \]

**CLT**

\[ z = \frac{\bar{x} - \mu}{\hat{SE}} \]

95% confidence interval:

\[ \bar{x} \pm 1.96 \hat{SE} \]

**Long-run list** (stat. inc. of 1907)

- hops
- yeast
- barley
- water

**William Gosset (1908)**

- Account: for uncertainty in...

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

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**Degrees of freedom**

\[ h = 35 \]

\[ h - 1 = 34 \]

**t** curve

\[ \text{nu} \text{ "new"} \]

\[ \text{nu} \text{ "new"} \]

\[ \text{nu} \text{ "new"} \]

\[ h = 35 \]

\[ h - 1 = 34 \]

**Normal curve**

\[ -2.064 \rightarrow +2.064 \]

\[ -1.96 \rightarrow +1.96 \]

**t** table: $L - 142$
\[ \bar{Y} \pm 2.064 \text{SE} \]

Neyman's confidence trick

\[ P \left( \bar{Y} - 2.064 \text{SE} \leq \mu \leq \bar{Y} + 2.064 \text{SE} \right) = 95\% \]

\[ P \left( \bar{Y} - 2.064 \text{SE} \leq \mu \leq \bar{Y} + 2.064 \text{SE} \right) \]

as a 95\% confidence interval for \( \mu \)
24.3°C ± 95% CI for μ

\[
\mu_0 = 24.44°C, 25.0°C, 25.56°C
\]

\[\bar{x} = 24.3°C\]

At 95% level of confidence, the theory value of 24.3°C is not supported by the data; the diff. between \(\bar{x}\) (25.0°C) & \(\mu_0\) (24.3°C) is statistically significant (statist.)