Chapter 1

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Quick review (1)

- In **hypothesis testing** we want to consider the plausibility of a specific claim (claims are called hypotheses)

  H_0 *: "H-naught," "H-null," or "null hypothesis."*

  H_1 *(sometimes written as* H_a *): "alternative hypothesis."*

- The null hypothesis (H_0)
  - Gets the benefit of the doubt
  - The default belief or "status quo"
  - Associated with no change in course
- The alternative hypothesis (H_1)
  - Carries the burden of proof
  - Change our belief
  - Requires us to take some action or change our action
- Three setup for tests:
  - Alternative: $\mu \neq \mu_0$ (two tailed test)
  - Alternative: $\mu > \mu_0$ or $\mu < \mu_0$(right/left tail test)

Quick review (2)

Procedure of testing When σ is known, $Z_{\bar{X}} = \frac{\bar{X}-\mu}{\sigma/\sqrt{n}} \sim N(0,1)$

1. Identify the hypotheses with a hypothesized value for μ, μ_{H_0}.
2. Determine the significance level, α
3. Calculate the z-test statistic $z_{\bar{x}} = \frac{\bar{x}-\mu_{H_0}}{\sigma/\sqrt{n}}$
4. Critical value method (or rejection region method)
   - critical z-score identifies the rejection region
   - determined by α : z_α (upper-tail), $-z_\alpha$ (lower-tail) or $\pm z_{\alpha/2}$ (2-tail)
   - compare the test statistic with the critical value(s): Reject H_0 if test statistic falls in the rejection region
5. p-value method:
   - The p-value (sometimes referred to as the observed level of significance) is the probability of observing a sample mean (or test statistic) at least as extreme as the one selected for the hypothesis test, assuming the null hypothesis is true.
   - Compare p-value with α. Reject H_o if p-value is less than α.