Review of Parts V & VI

Math 2200
What we have learned

- Central Limit Theorem
- Confidence interval
  - Critical value
  - Margin of error = critical value * standard error
- Hypothesis testing
  - Null versus alternative (one-sided / two-sided)
  - Type I & Type II error
  - Significance level & Power
  - P-value
- One-proportion z-interval (test)
- Two-proportion z-interval (test)
- One-sample t-interval (test)
- Two-sample t-interval (test) (pool or not?)
- Paired t-interval (test)
- Chi-squared test (GOF or Independence/Homogeneity)
Sampling distribution

- Property of normal distribution
  - Let $X_1, X_2, \ldots, X_n$ be a random sample from a normal distribution.
    - Distribution of the sample mean: t distribution
    - The probability that the sample mean $> c$: tcdf
Confidence interval

- The critical value: invNorm, invT
- The standard error
- The relationship among sample size, margin of error, and confidence level
- Interpretation of the confidence interval
Hypothesis testing

• Type I & Type II errors
  – The relation between Type I and Type II
  – The relation to sample size
• The significance level & the power
• Interpret the p-value
• Find the p-value
How to find p-value?

• One-sided versus two-sided
• TI-83
  – DISTR \((2^{\text{ND}}+\text{VARS})\)
  – 2: NORMALCDF(left,right,mean,stderr)
  – 5: TCDF(left,right,df)
  – 7: \(\chi^2\text{CDF}(\text{left}, \text{right}, \text{df})\)
Conditions

• Independence (except for paired methods)
• Randomization
• 10% condition
• for one/two sample t-type methods
  – Nearly Normal
• For one/two proportion z-type methods
  – Sample size condition
  – Success failure condition
• For goodness-of-fit test
  – Expected cell frequency condition
How to use TI-83?

- **STAT > TESTS**
  - 2: One-sample t-test
  - 4: Two-sample t-test
  - 5: One-proportion z-test
  - 6: Two-proportion z-test
  - 8: One-sample t-interval
  - 0: Two-sample t-interval
  - A: One-proportion z-interval
  - B: Two-proportion z-interval
  - C: $\chi^2$-test
Options in TI-83

• Input:
  – Data or Stats

• Alternative hypothesis
  – Two-sided or one-sided (left tail or right tail)

• Equal variances assumption
  – Pooled: Yes or No
Sample size

• For a given margin of error, find the sample size