Midterm Review for STAT 423/523

1. Sample Means Properties
    - Expectation.
    - Variance.
    - Distribution (Normal case and CLT case)
2. MoM Estimator
    - Definition.
    - Number of equations = Number of parameters.
    - Properties of the estimator.
3. MLE Estimator
    - Definition.
    - Likelihood function.
    - Maximization through logarithm and differentiation.
4. Confidence Intervals
    - Definition (Confidence interval, confidence level).
    - Normal Confidence interval for mean.
    - t-Confidence interval for mean.
5. Hypotheses Testing (General)
    - Hypotheses.
    - Two-sided vs. One-sided tests.
    - Test statistic.
    - P-value.
    - Decision rule.
    - Type I and Type II errors.
6. One-sample Z-Test / T-Test.
    - Hypotheses. (comparing mean to a given value)
    - Test statistic. (Z-statistic or T-statistic)
    - Decision rule, P-value.
    - Relation to confidence interval.
    - Assumptions.
    - Power and sample size calculation.
    - Read output from R program.

7. Two-sample T-Test.

   - Hypotheses. (comparing means of two populations)
   - Types: Equal variance vs. Unequal variance. Paired vs. unpaired.
   - Test statistic. (construction of the test statistic)
   - Decision rule, P-value.
   - Different assumptions.
   - Read output from R program.