Instructor: Shiwen Shen

Chapter 4: Continuous Random Variable

- Understand probability density function (pdf) and the difference between pdf and pmf (probability mass function).
- Know how to calculate cdf with given pdf, and know how to calculate pdf with given cdf.
- properties of pdf.
- Know how to calculate mean and variance of a continuous random variable (using integration).
- Know how to use integration by parts and product rule (for differentiation).
- Exponential distribution (the meaning of the random variable, pdf, cdf, mean, variance, shorthand notation, shape of the pdf).
- Know the relationship between Poisson distribution (in chapter 3) and Exponential distribution.
- Understand and know how to use lack of memory property.
- Weibull distribution (the meaning of the random variable, pdf, cdf, mean, variance, shorthand notation, shape of the pdf).
- Know the relationship between Weibull and Exponential distribution.
- Normal distribution (the meaning of the random variable, pdf, cdf, mean, variance, shorthand notation, shape of the pdf).
- Characteristics of Normal pdf.
- Understand empirical rule.
- Understand standard normal distribution and know how to use standardizing technique to calculate normal distribution probabilities (with stand normal probability table).

Chapter 5: Statistical Inference (in General)

- Understand two major tasks for statistical inference.
- Know the difference between population and sample.
- Know the difference between parameter and statistic.
- Understand common point estimator for sample mean/variance/standard deviation/proportion.
- Understand the difference between accurancy and precision.
- Understand the meaning of unbiased estimator.
- Understand the difference between estimator and estimate.

Chapter 6: Statistical Inference (Single Sample)

- Understand central limit theorem.
- Know the asymptotic distribution for sample proportion \hat{p} and sample mean \bar{Y} (with known or unknown variance).
- Know how to construct a confidence interval for population proportion p and population mean μ .
- Understand where does the t distribution come from and the difference between t distribution and normal distribution.
- Understand degree of freedom in t distribution.
- Know how to use t table.
- Understand the meaning of standard error, margin of error, α , $z_{\alpha/2}$, $t_{n-1,\alpha/2}$ in confidence interval.
- Understand the meaning of hypothesis.
- Know how to conduct a hypothesis testing by the 4-step procedure (for population proportion p, population mean μ with assumption variance know or unknown).
- Understand Type I and Type II error, and know the meaning of α in hypothesis.
- Know how to read quantile-quantile (qq) plots.
- Know how to calculation the sample size when the length of confidence interval or margin of error is restricted.