Class notes

1. Midterm will be held in class 1400-1600, 030618 (Wed) at B101. You can bring along a calculator and a cheatsheat of size A4 with you. I will explain this part in class. **Be Prepared!**.

2. Material covered in class (before and after midterm). Midterm Exam.

3. Outline of topics you should know for the final. Please refer to your notes for more details.

   1. Point Estmation: Joint probability density function, joint probability mass function and likelihood function. Maximum Likelihood Estimator. MLE for $X_1, \cdots, X_n$ iid from Bernoulli, Normal distribution.
   2. Confidence Intervals for Normal Mean: Calculate a $(1-\alpha)$ (exact) confidence interval for θ when $X_1, \cdots, X_n$ iid from $N(\theta, \sigma^2)$
      - Known σ^2: where z_α s.t. $\Phi(z_\alpha) = P(Z \le z_\alpha) = 1-\alpha$.

$$C_2(X) = [\bar{X} - \frac{\sigma}{\sqrt{n}} z_{\alpha/2}, \bar{X} - \frac{\sigma}{\sqrt{n}} z_{\alpha/2}],$$
$$C_{1L}(X) = [\bar{X} - \frac{\sigma}{\sqrt{n}} z_\alpha, \quad \infty),$$
$$C_{1U}(X) = (-\infty, \quad \bar{X} + \frac{\sigma}{\sqrt{n}} z_\alpha]$$

      - Unknown σ^2: where $t_{n-1;\alpha}$ s.t. $P(T_{n-1} \le t_{n-1;\alpha}) = 1-\alpha$. $S^2 = \frac{1}{n-1} \sum_{i=1}^n (X_i - \bar{X})^2$

$$C_2(X) = [\bar{X} - \frac{S}{\sqrt{n}} t_{n-1;\alpha/2}, \bar{X} - \frac{S}{\sqrt{n}} t_{n-1;\alpha/2}],$$
$$C_{1L}(X) = [\bar{X} - \frac{S}{\sqrt{n}} t_{n-1;\alpha}, \quad \infty),$$
$$C_{1U}(X) = (-\infty, \quad \bar{X} + \frac{S}{\sqrt{n}} t_{n-1;\alpha}]$$

   3. Confidence interval for population mean (large sample): Calculate an asymptotic $(1-\alpha)$ (approximated) confidence interval for θ when $X_1, \cdots, X_n$ iid from a population and $E(X_i) = \theta$. $t_{n-1;\alpha}$ s.t. $P(T_{n-1} \le t_{n-1;\alpha}) = 1-\alpha$. $S^2 = \frac{1}{n-1} \sum_{i=1}^n (X_i - \bar{X})^2$

$$C_2(X) = [\bar{X} - \frac{S}{\sqrt{n}} t_{n-1;\alpha/2}, \bar{X} - \frac{S}{\sqrt{n}} t_{n-1;\alpha/2}],$$
$$C_{1L}(X) = [\bar{X} - \frac{S}{\sqrt{n}} t_{n-1;\alpha}, \quad \infty),$$
$$C_{1U}(X) = (-\infty, \quad \bar{X} + \frac{S}{\sqrt{n}} t_{n-1;\alpha}]$$

Note: since n is assumed to be large, say greater than 30 here. t