chapter 4: distributions of functions of Random variables.

4.1: sampling Theory.

Def 1: a function of one or more Random variables that does Not depend up on any unknown parameter is called a statistic.

Def 2: let $X_1, X_2, \dots, X_n$ be n indep. random variables each of which has the same but possibly unknown p.d.f that is, the p.d.f's of $X_1, \dots, X_n$ are respectively $f_1(x_1) = f(x_1)$, $f_2(x_2) = f(x_2)$, ..., $f_n(x_n) = f(x_n)$ so that the joint p.d.f of $X_1, \dots, X_n$: $f_1(x_1) \cdots f_n(x_n) = f(x_1) \cdots f(x_n)$.
The Random variables $X_1, \dots, X_n$ are said to constitute a Random sample from dist. that has p.d.f $f(x)$, that is the observations of a Random sample are independent and identically distributed (often abbrenated as i.i.d).

Def 3: $X_1, \dots X_n$ Random sample of size n

- $\bar{X} = \dfrac{X_1 + X_2 + \dots + X_n}{n} = \dfrac{1}{n} \sum_{i=1}^{n} X_i$ « statistic called sample mean »

- $S^2 = \dfrac{\sum (X_i - \bar{X})^2}{n}$ « statistic called sample variance »

RMK: $S_{n-1}^2 = \dfrac{\sum (X_i - \bar{X})^2}{n-1}$ « statistic called sample variance »

exp 1 X