

PSTAT 115 - Section Two

Winter 2023

Sufficient Statistics

- Step Up: We have a sequence of independent and _____ random variables from some distribution $p_{\theta}(\mathbf{y})$. We collect a *random sample* _____ of size n .

Note. We represent $y = (\text{_____})$ to represent a single sample of _____ (_____ letters)!

- Goal: to draw inference (from the observed data) on the parameter θ (comes from distribution $p(\mathbf{y})$).

Definition (Likelihood). The _____ $L(\theta) = p(y_1, \dots, y_n | \theta)$ represents the _____ of the data \mathbf{y} for a given _____. **General Equ:** _____.

Definition (Sufficient Statistic).

- i) A statistic T is a _____ function of the sample _____.

Special Case: a statistic T is called a **sufficient statistic** if _____ of $(Y_1, \dots, Y_n) | T$ doesn't depend on _____ !

Theorem (_____). *A statistic T is sufficient _____ on writes,*

$$p_{\theta}(\mathbf{y}) = g_{\theta}(T(\mathbf{y})) \times \underline{\hspace{2cm}}.$$

Question 1. Let X_1, X_2, \dots, X_n be i.i.d $N(\mu, \sigma^2)$ random variables. Find the sufficient (minimal statistic) T .

Notes

[illegible]