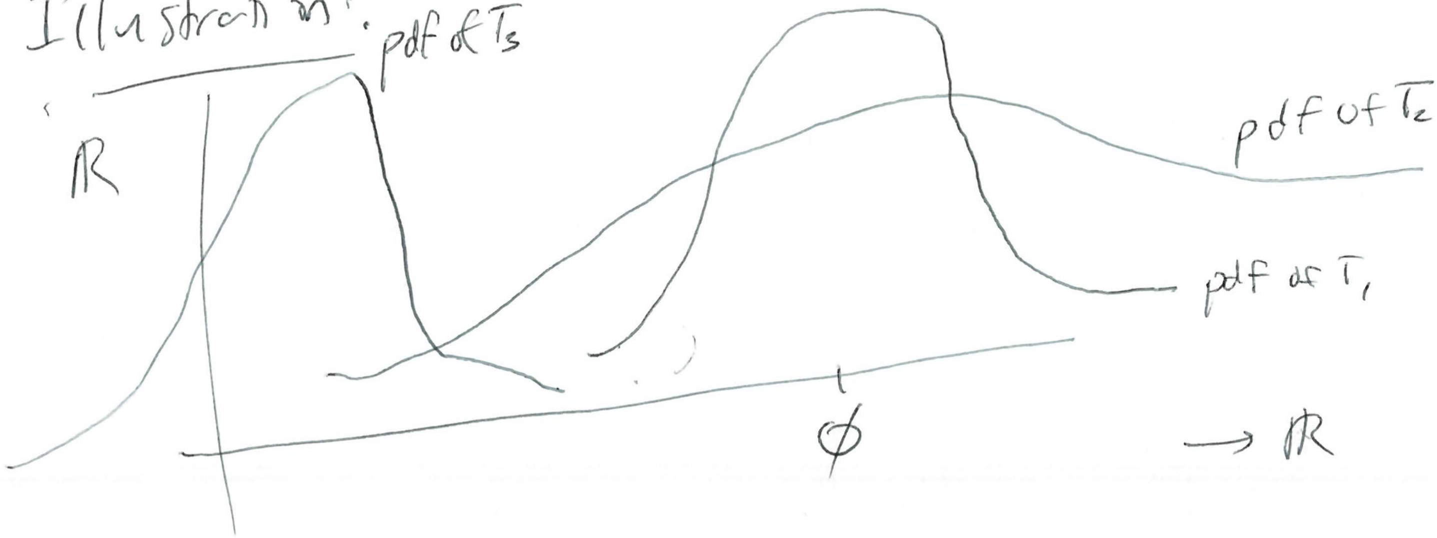
The command prcomp in R does principal components analysis

Illustration:



T_1 and T_2 are unbiased for ϕ

but $Var(T_2) >> Var(T_1)$ and T_2 is a poor estimator.

~~T_3~~ $Var(T_3)$ is small, but $E(T_3) << \phi$

so T_3 is a poor estimator.

T_1 is the best estimator.

Estimation

Assume data $y_1, \dots, y_n$ is generated by random variables $Y_1, Y_2, \dots, Y_n$ which have a joint distribution specified by parameter $\theta_1, \theta_2, \dots, \theta_p$.

We want to to estimate a known function of the parameters $\phi(\theta_1, \dots, \theta_p)$. We use a statistic $T: \mathbb{R}^n \to \mathbb{R}$ to estimate $\phi(\theta_1, \dots, \theta_p)$, for example, $T(y_1, \dots, y_n) = \frac{1}{n} \sum_{i=1}^{n} y_i$

The random random variable $T(Y_1, \dots, Y_n)$ is an <u>estimator</u> of ϕ and $T(y_1, \dots, y_n)$ is an <u>estimate</u> of ϕ.

We want to find good estimators of ϕ.

Therefore, we wand $E(T(Y_1, \dots, Y_n)) \approx \phi$ and $Var(T(Y_1, \dots, Y_n))$ to be small