

Chapter 2

Location

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Data: n Real-valued measurements $y_1, \dots, y_n$

Let $\mu = E\{Y_i\}$ be the (unknown) mean from the population.

Suppose we had a value (μ_0) that we were wondering about for μ ($\mu = \mu_0?$).
How could we decide?

Same 3 ingredients

1) model $Y_i \stackrel{iid}{\sim} N(\mu, \sigma^2)$ assume σ^2 known

density $f(y) = \frac{1}{\sqrt{2\pi\sigma^2}} \exp\left\{-\frac{1}{2\sigma^2} (y - \mu)^2\right\}$

$$\text{so... } f(y_1, \dots, y_n) = \prod_{i=1}^n f(y_i)$$

$$= (2\pi\sigma^2)^{-n/2} \exp \left\{ -\frac{1}{2\sigma^2} \sum_{i=1}^n (y_i - \mu)^2 \right\}$$

2) Hypotheses

$$H_0: \mu = \mu_0 \quad (64.5)$$

$$H_1: \mu \neq \mu_0$$

3) Statistic using 1 & 2)

$$f(y_1, \dots, y_n) = (2\pi\sigma^2)^{-n/2} \exp \left\{ -\frac{1}{2\sigma^2} \sum_{i=1}^n (y_i - \mu)^2 \right\}$$

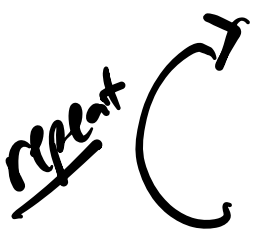
$$= c \exp \left\{ -\frac{1}{2\sigma^2} \left[\sum y_i^2 - 2\mu \sum y_i + n\mu^2 \right] \right\}$$

Apparently $s(y_1, \dots, y_n) = \sum_{i=1}^n y_i$

is good.

$$\underline{\underline{\text{or}}} \quad = \frac{1}{n} \sum_{i=1}^n y_i = \bar{y}_n$$

How to conduct the test?

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- Assume H_0
 - Generate "data"
 - Calc stat
 - Compare to observed stat