T-test

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Agenda :-

(★) Framework :-

1) H_0 & H_a
null alternate

2) Statistic & distribution

3) Left vs Right / two-tailed

4) P-value

5) $\alpha = 0.05$ → 95%

Z-test:

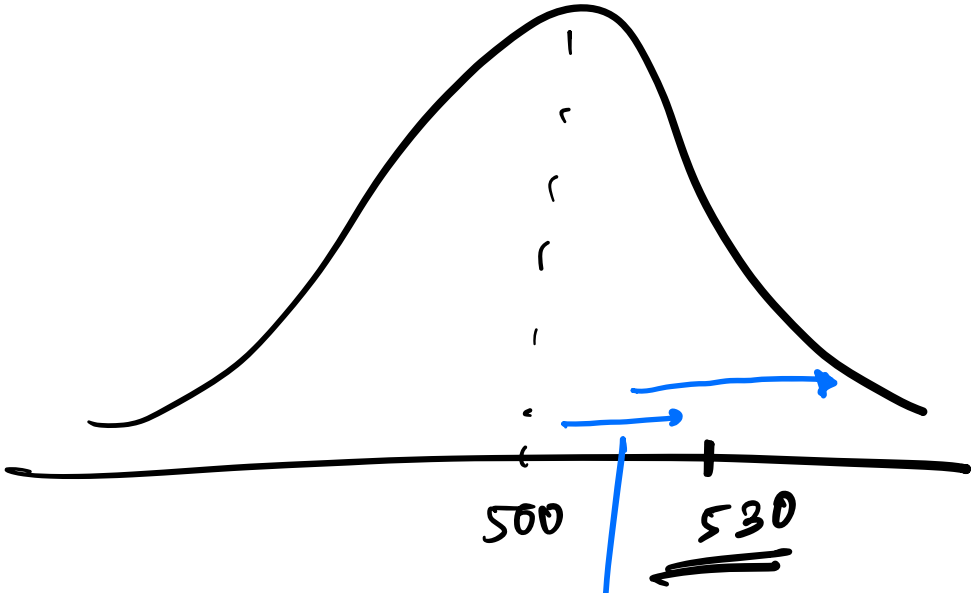
1) $H_0: \mu = 500$

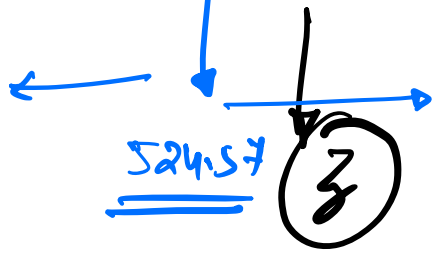
$H_a: \mu > 500$

2) 70 day sample

$$\sigma_m = \frac{125}{\sqrt{70}}$$

$$Z\text{-score} = \frac{x - \mu}{\sigma_m} = \frac{530 - 500}{\frac{125}{\sqrt{70}}}$$





$$z = \frac{x - \mu}{\sigma_m}$$

$$x = z * \sigma_m + \mu$$

⊛ Cognitive Enhancement Pill

↳ Improving IQ

Test :-

(i) Improved IQ scores

(ii) No significant impact/effect

Complexities :-

1. Std-dev of the population IQ score is not known
2. Sample size is small

$n \leq 30$

↳ T-test

Types of T-test

1. One-sample t-test
   (bunch of data points in a sample, compared to a single number)
2. 2-sample t-test (independent)
3. 2-sample t-test (dependent)

(8.1) 1 Sample → (IQ Scores)

mean IQ of the population = 100

H_0 = $\mu = 100$ (pill has no effect)

H_a = $\mu > 100$ (pill has pos effect)

$$t\text{-stat} = \frac{\bar{x} - \mu}{\sigma_m}$$

Possibilities :-

(1) $H_0 : \mu_1 = \mu_2$

$H_a : \mu_1 \neq \mu_2$

} two-sided

(2) $H_0 : \mu_1 = \mu_2$

$H_a : \mu_1 > \mu_2$ ⟶ "greater"

(3) $H_0 : \mu_1 = \mu_2$

$H_a : \mu_1 < \mu_2$ ⟶ "less"

Paired t-test (dependent)