1. A factory has a machine that dispenses 80 mL of fluid in a bottle. An employee believes the average amount of fluid is not 80 mL. Using 40 samples, he measures the average amount dispensed by the machine to be 78 mL with a standard deviation of 2.5. (a) State the null and alternative hypotheses. (b) At a 95% confidence level, is there enough evidence to support the idea that the machine is not working properly?

$H_0 : \mu = 80$

$H_A : \mu \neq 80$

$\bar{X} = 78 \sim \mu \; ; n = 40$

$\sigma = 2.5 \; ; \alpha = 0,05$

X : {contenido de mL en botella}

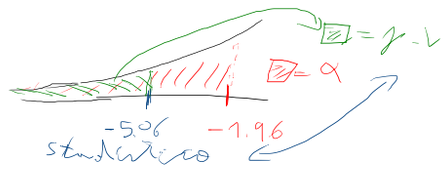
$\bar{X} = \frac{1}{40}\sum_{i=1}^{40} X_i \sim \mu$

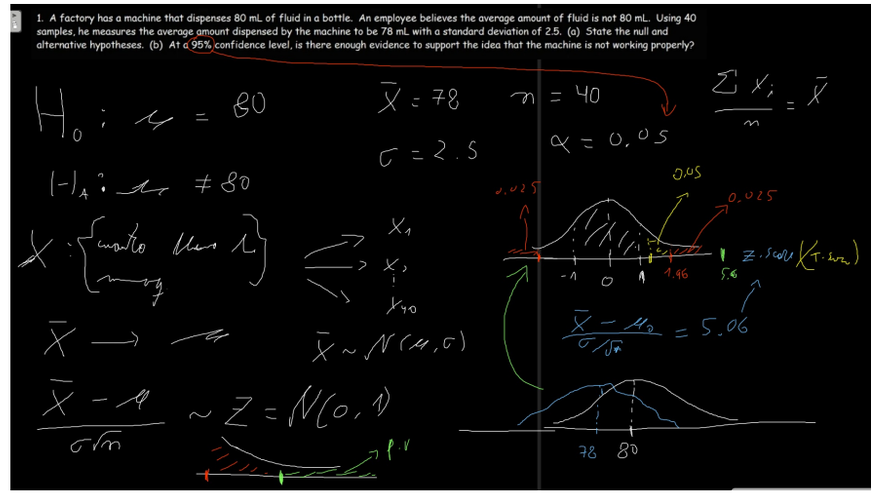
$\bar{X} \xrightarrow[n\to\infty]{} \mu$ (LLN)

$\frac{\bar{X} - \mu}{\sigma/\sqrt{n}} \sim Z = N(0,1)$

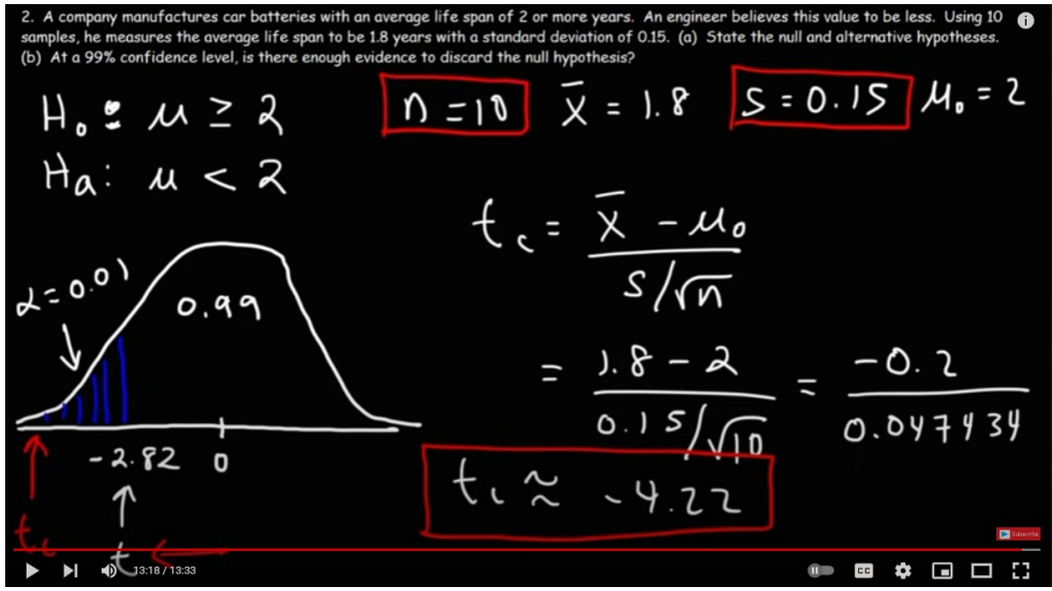
$\bar{X} \sim N(\mu, \sigma/\sqrt{n})$ (CLT)

$\frac{\bar{X} - \mu_0}{\sigma/\sqrt{n}} = \frac{78 - 80}{2.5/\sqrt{40}} = -5,06 = Z_0$





2. A company manufactures car batteries with an average life span of 2 or more years. An engineer believes this value to be less. Using 10 samples, he measures the average life span to be 1.8 years with a standard deviation of 0.15. (a) State the null and alternative hypotheses. (b) At a 99% confidence level, is there enough evidence to discard the null hypothesis?



1. A factory has a machine that dispenses 80 mL of fluid in a bottle. An employee believes the average amount of fluid is not 80 mL. Using 40 samples, he measures the average amount dispensed by the machine to be 78 mL with a standard deviation of 2.5. (a) State the null and alternative hypotheses. (b) At a 95% confidence level, is there enough evidence to support the idea that the machine is not working properly?

$H_0: \mu = 80$

$H_A: \mu \neq 80$

X : {cont. de ml per 1 bot.} → $X_1, X_2, X_3, \ldots, X_{40}$

$\bar{X} \xrightarrow{LLN} \mu$

$\bar{X} \sim N(\mu, \sigma)$

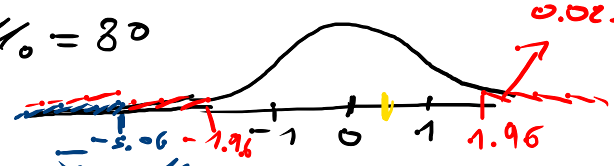
$$\frac{\bar{X} - \mu}{\sigma / \sqrt{n}} \sim Z = N(0,1)$$

$\bar{X} = 78 \quad n = 40$

$\sigma = 2.5 \quad \alpha = 0.05$

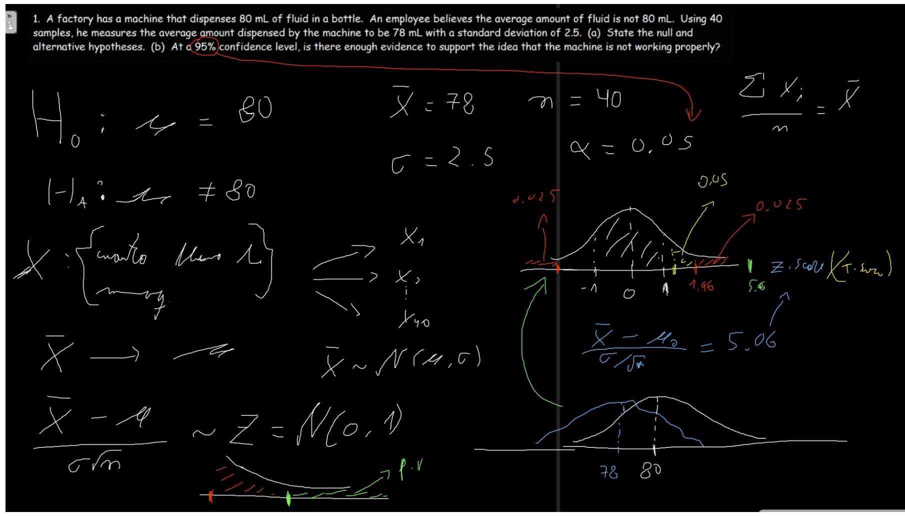
$\mu_0 = 80$

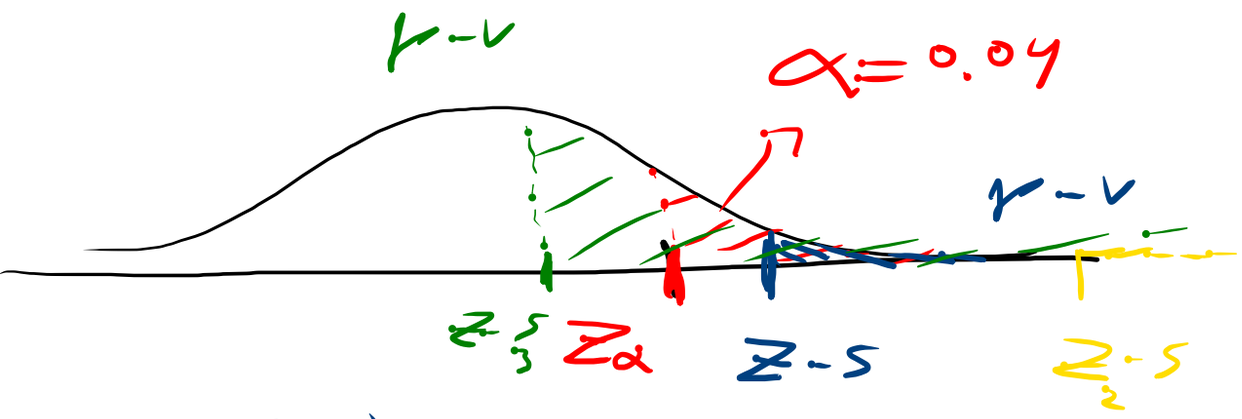
$$\bar{X} = \frac{\sum X_i}{n}$$



$$\frac{\bar{X} - \mu_0}{\sigma / \sqrt{n}} = -5.06 \rightarrow Z\text{-Score}$$

T-Score





$p - v < \alpha$

$|z_\alpha| < |z_{-\alpha}|$

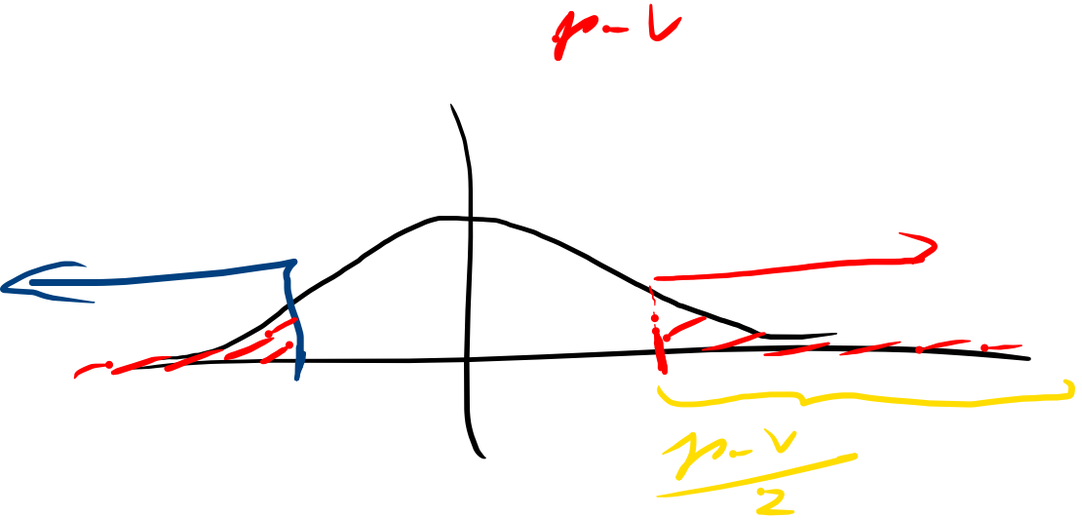
$p - v \rightarrow 0.05$

$\rightarrow 0.5$

$p - v \rightarrow 0.0000001$

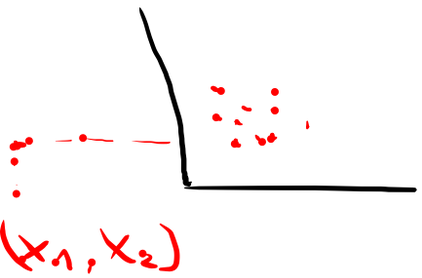
$p - v \rightarrow 0.001$

$p - v \rightarrow 0.04$

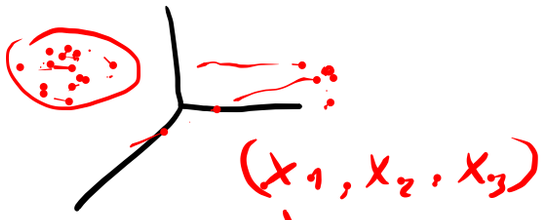


$$\frac{\bar{x} - \mu_0}{\sigma/\sqrt{n}} \rightarrow z_3 > 0$$

$$\bar{x} > \mu_0 \Rightarrow \bar{x} - \mu_0 > 0$$



(x_1, x_2)



(x_1, x_2, x_3)

$$X = \begin{pmatrix} x_1 \\ x_2 \\ \vdots \\ x_m \end{pmatrix}$$