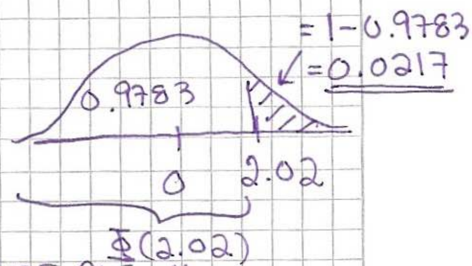
POWER EXAMPLE

Ex. 11 a) 1. μ = durée moyenne

2. $H: \mu = 60{,}000$

$A: \mu > 60{,}000$

3. $T = \dfrac{\bar{X} - \mu_H}{\sigma/\sqrt{n}} \Rightarrow t_{obs} = \dfrac{60{,}758 - 60{,}00}{1500/\sqrt{16}} \approx 2.02$



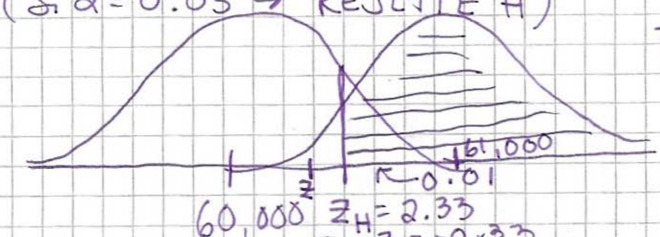
4. [Sous H, $T \sim N(0,1)$] $\Rightarrow p_{obs} = P(Z > 2.02)$

$= \underline{0.0217}$

5. $p_{obs} = 0.0217 \overset{?}{<} 0.01 \; (=\alpha) \Rightarrow$ NON $\Rightarrow$ NE REJETTE PAS H

(Si $\alpha = 0.05 \Rightarrow$ REJETTE H)

b)



$\bar{X}_{crit} = \mu_H + z_H \times \sigma/\sqrt{n}$

$= 60{,}000 + 2.33 \times 1500/\sqrt{16}$

$= \underline{60{,}875}$

Standardisez $\bar{X}_{crit}$ selon l'hypothèse ALTERNATIVE:

$\dfrac{\bar{X}_{crit} - \mu_A}{\sigma/\sqrt{n}} = \dfrac{60{,}875 - 61{,}000}{1500/\sqrt{16}} = \dfrac{-125}{375} = \underline{-0.33}$

Puissance $= 1 - \Phi(-0.33) = \Phi(0.33) = 0.6293 \approx \underline{63\%}$

c) On veut trouver Z_A^{nouvelle} telle que $1 - \Phi(Z_A^{\text{nouvelle}}) = 0.90$

(*) $\Rightarrow Z_A^N = -1.28$

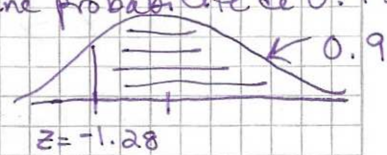
On veut: $P\left(\bar{X} > \mu_H + Z_{(1-\alpha)}\,\sigma/\sqrt{n} \;\middle|\; \mu_A\right) = 0.9$

$\Rightarrow P\left(\boxed{\dfrac{\bar{X} - \mu_A}{\sigma/\sqrt{n}}} > \dfrac{\mu_H - \mu_A + Z_{(1-\alpha)}\,\sigma/\sqrt{n}}{\sigma/\sqrt{n}}\right) = 0.9$ [contrer-réduire]

$\Rightarrow P\left(Z > \dfrac{\mu_H - \mu_A}{\sigma/\sqrt{n}} + Z_{(1-\alpha)}\right) = 0.9$

$\Rightarrow \dfrac{\mu_H - \mu_A}{\sigma/\sqrt{n}} + Z_{(1-\alpha)} = -1.28$

(*) $\Rightarrow$ La Z qui corresponde à une probabilité de 0.9 à droit



$\Rightarrow \dfrac{60{,}000 - 61{,}000}{1500/\sqrt{n}} + 2.33 = -1.28$

$\Rightarrow \sqrt{n} = \dfrac{-3.61 \times 1500}{(60{,}000 - 61{,}000)} = 5.415$

$\Rightarrow n = (5.415)^2 = 29.32$

$\Rightarrow \underline{n = 30}$