not reliable

exercise 6 probability.

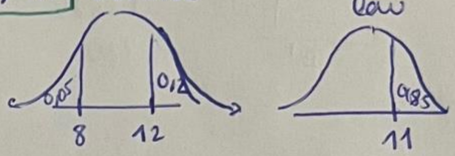
	low		normal
	σ	=	σ
	μ	$\neq$	μ'

normal diet x : months

$P(x>12) = 0,2 = P\left(z > \frac{12-\mu}{\sigma}\right) = 0,2 \rightarrow \boxed{P\left(z < \frac{12-\mu}{\sigma}\right) = 0,8}$ 2

$P(x<8) = 0,05 = \boxed{P\left(z < \frac{8-\mu}{\sigma}\right) = 0,05}$ 1

normal low



a) low diet

$P(x>11) = 0,85 = P\left(z > \frac{11-\mu}{\sigma}\right) = 0,85$

normal inside table

1 $\frac{8-\mu}{\sigma} = -1,645$; and 2 $\frac{12-\mu}{\sigma} = 0,845$

sistema de ecuaciones. Elijo método de sustitución.

↳ since $\sigma_N = \sigma_L$ igualo μ y μ para obtener σ y así poder sacar no solo σ en low sino su μ! ⇒ σ y μ

2. $8-\mu = -1,645\sigma$; $-\mu = 0,845\sigma - 12$

$\mu = -0,845\sigma + 12$

1. $\frac{8-[-0,845\sigma+12]}{\sigma} = -1,645$

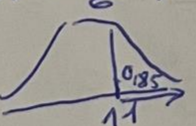
$\frac{0,845\sigma-4}{\sigma} = -1,645$; $0,845\sigma - 4 = -1,645\sigma$;

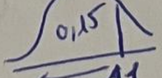
Result of a): ; $-2,49\sigma = -4$; $\sigma = 1,606$ ⇒ my σ for low and normal diet

For μ of low diet.

$P\left(z > \frac{11-\mu}{\sigma}\right) = 0,85 \Rightarrow$ (*) $P\left(z < \frac{11-\mu}{\sigma}\right) = 0,15$ ($1-0,85$) ; $\frac{11-\mu}{\sigma} = -1,35$; $\frac{11-\mu}{1,606} = -1,35$;

; $\boxed{\mu = 8,8319}$





(*) We do this because our gaussian data table goes to the left, so all our data is for whe x value (11 here) goes to $-\infty$, so if it is $z>$, it is to ∞, to change we substract 1 - prob.

$\mu = 10,64$ ← for normal diet; $\sigma = 1,606$

↳ $\mu = -0,845\sigma + 12$

2. $\mu = -0,845 \cdot (1,606) + 12 = 10,64$

b) normal $P(x<9) = P\left(z < \frac{9-\mu}{\sigma}\right) = P(z < -1,02) = 0,153$

low $P(x<9) = P(z < -2,28) = 0,0113$ ⇐ low: $\sigma = 1,606$, $\mu = 8,8319$

Total ⇒ $P(x<9) = 0,4 \cdot$ normal $+ 0,6 \cdot$ low $= 0,4 \cdot 0,153 + 0,6 \cdot 0,0113 = \boxed{0,068}$

exercise 6. PROBABILITY

2.

$\underbrace{\mu = 4,5 \quad \sigma = 0,2}_{\text{doped athletes}}$ $\qquad$ $\underbrace{\mu = 3 \quad \sigma = 0,3}_{\text{non-doped athletes.}}$

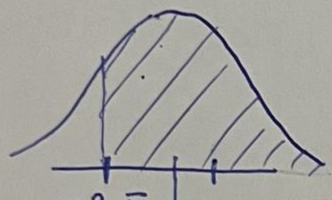
Positive when $P(x>4)$

a) $\underline{\text{sensitivity}} = P(+/D)$ = cases correctly identified as positive where here is when concentration $> 4 \mu g/mL$

wher D: doped

$$P(+/D) = P(x>4) = P\left(z > \frac{4-4,5}{0,2}\right) = P(z>-2,5) = 1-\Phi(-2,5) =$$

$$= 1-0,0062 = \underline{\underline{0,9938}} \text{ = Result}$$



-2,5

(μ)

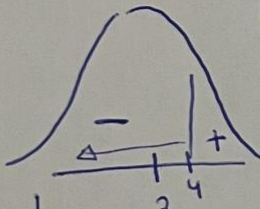
$\underline{\text{specificity}}$

$$P(-/\bar{D}) = P(x<4) = P\left(z < \frac{4-3}{0,3}\right) = P(z<3,33) = \underline{\underline{0,9996}}$$

= Result

$\underbrace{1-\underbrace{P(x>4)}_{\text{positive}}}_{\text{negative}}$

$\bar{D}$ → non doped $\mu = 3$, $\sigma = 0,3$



$\underbrace{P(x<4)}$ = negativo

b) 10% doped ; PPV is $P(D/+)$ $= \frac{P(D\cap +)}{P(+)} = \frac{P(+/D)\cdot P(D)}{P(D\cap +) + P(\bar{D}\cap +)} =$

μ 4,5 and $\sigma = 0,2$; $P(D)$ = 10%

=> also expressed like => $\frac{P(+/D)\cdot P(D)}{P(+/D)P(D) + P(+/\bar{D})\cdot P(\bar{D})}$ $= \frac{0,9938 \cdot 0,1}{0,9938 \cdot 0,1 + 0,0004 \cdot 0,9} =$

$\boxed{\text{sensitivity} = 0,9938}$ | 0,1 | ⊛ 0,0004 | 1-0,1

$= \underline{\underline{0,9964}}$

= Result

$$P(x>4) = 1-P(x<4) = 1-P(z<3,33) = 1-0,9996 = 0,0004$$

⊛ $\underbrace{P(x>4)}_{\text{Positive}}$

so $\underline{\text{for non doped}}$ => $\mu = 3$, $\sigma = 0,3$