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SOCI 213 - STATISTICS II

ASSIGNEMENT 3

Exercice 1

Question 1 : Proportion of scores

a) $Z=\frac{50-47}{10}=0,3$

—> p = 0,12 or 12%

b) 50 % + 12% = 62 %

c) 50 % + 12 % = 62%

d) Z = $\frac{35-50}{10}=-1,5$

—> p = 0,43 or 43%

$Z=\frac{65-50}{10}=1,5$

—> p = 0,43 or 43%

Therefore, between 35 and 65 : 43% + 43% = 86%

e) $Z=\frac{40-50}{10}=-1$

—> p = 0,34 or 34%

$Z=\frac{47-50}{10}=-0,30$

—> p = 0,12 or 12%

Therefore, between 40 and 47 : 34% - 12% = 22%

f) $$Z=\frac{72-50}{10}=2,2$$

—> p = 0,40 or 49%

Above 72 = 59% - 49% = 1%

g) $$Z=\frac{31-50}{10}=-1,9$$

—> p = 0,47 or 47%

Below 31 = 50% - 47% = 3%

h) $$Z=\frac{55-50}{10}=0,5$$

—> p = 0,19 or 19%

$$Z=\frac{62-50}{10}=1,2$$

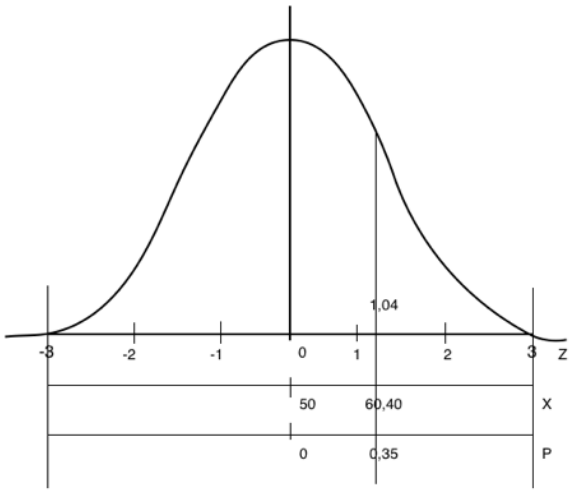
—> p = 0,38 or 38%

Therefore, between 55 and 62 : 38% - 19% = 19%

Question 2 : Score to be in the top 15% of the population distribution

p —> Z —> X
p = 0,50 - 0,15 = 0,35
Z = 1,04

X = μ ± Zσ
= 50 + 1,04 (10)
= 60,4
Therefore, we need a minimum of 60,4 to be in the top 15% of the population distribution.



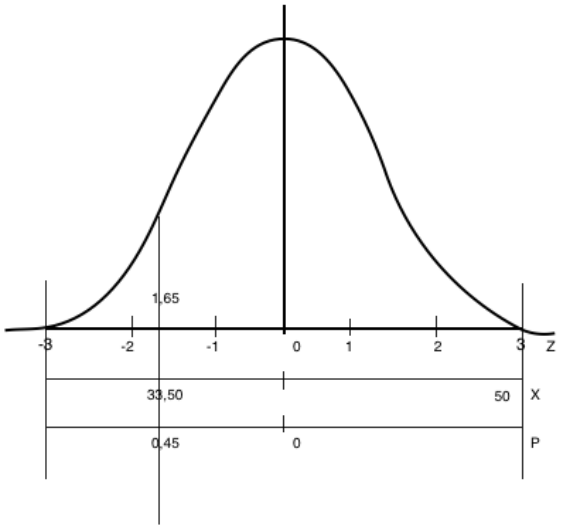
Question 3 : Score to be in the bottom 5% of the population distribution

p —> Z —> X

p = 0,50 - 0,5 = 0,45
Z = - 1,65

X = μ ± Zσ
= 50 - 1,65 (10)
= 35,5

Therefore, we need a maximum of 35,5 to be in the bottom 5% of the population distribution.



Question 4 : Probability of selecting a score less then 55

$$Z=\frac{x-\mu}{\sigma}=\frac{55-50}{10}=0,5$$

—> p = 0,19 or 19%

So, Less than 55 : 50 % + 19 % = 69 %
Therefore, the probability of selecting a score less then 55 is 69%.

Exercice 2

Question 1 : Probability of the sample mean

a) For less than 98%

$$Z=\frac{102-100}{0,35}=-5,71$$

—> p = 0,50 or 50%

For less than 98 : 50% - 50 % = 0%

b) For more than 102

$$Z=\frac{98-100}{0,35}=5,71$$

—> p = 0,50 or 50%

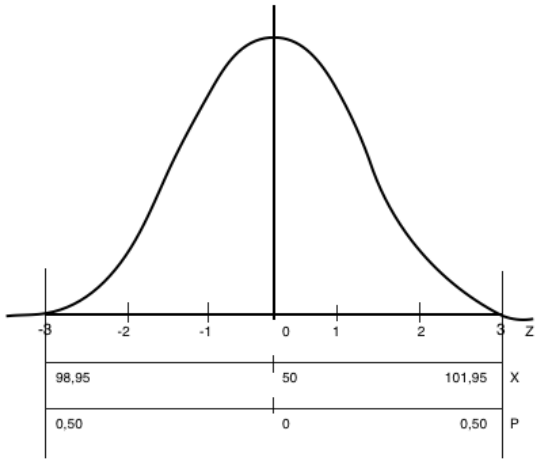
For more than 102 : 50% - 50% = 0%

c) Between 98 and 102 we find : 50% + 50% = 100%

Question 2 : Highest and lowest sample in the sampling distribution

We know that the highest and lowest same mean is equal to Z = +3 and -3
Limits for X = $\mu \pm Z\sigma_{X/}$

The highest sample mean : 100 + 3 (0,35) = 101,05
The lowest sample mean : 100 - 3 (0,35) = 98,95



Exercice 3

Question 1 : Proportion

a) Between 1 and 1,3

$$Z=\frac{1-1,3}{1,7}=-0,18$$

—> p = 0,07 or 7%

b) Below 2

$$Z=\frac{2-1,3}{1,7}=0,41$$

—> p = 0,16 or 16%

Therefore below 2 : 16% + 50 % = 66%

c) Between 2 and 3

$$Z=\frac{3-1,3}{1,7}=0,34$$

$$Z=\frac{2-1,3}{1,7}=0,41$$

—> p = 0,16 or 16%
—> p = 0,34 or 34%

Therefore between 2 and 3 : 34% - 16% =18%

d) Greater than 1

$$Z=\frac{1-1,3}{1,7}=-0,18$$

—> p = 0,07 or 7%

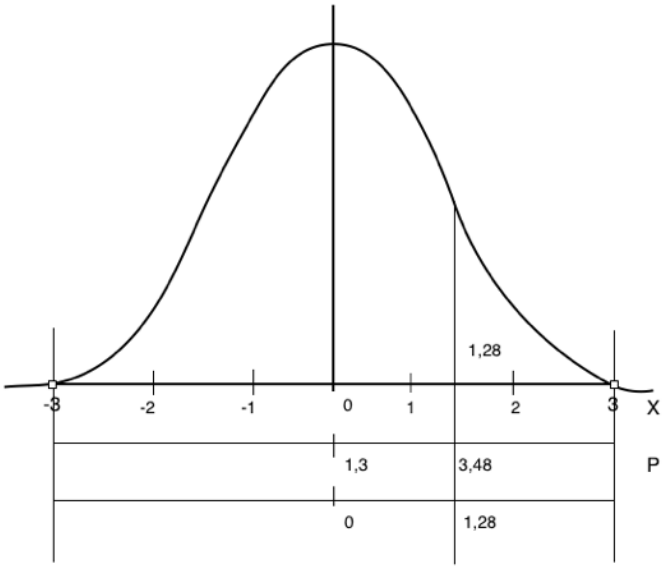
1 = 50% + 7% = 57%

Question 2 : Score to be on top of the 10% of the sample distribution?

p —> Z —> X
p = 0,50 - 0,10 = 0,40
Z = 1,28

X = X/ ± ZS
= 1,3 + 1,28 (1,7)
= 3,48

Therefore, we need a minimum of 3,48 to be in the top 10% of the sample distribution



Question 3 : Probability of selecting another sample with a mean

We know that sample parameters with interference :

$$Z=\frac{x-\mu}{\sigma X}=\frac{x-13}{0,24}$$

$$\sigma X=\frac{S}{\sqrt{N-1}}=\frac{1,7}{\sqrt{50-1}}=0,24$$

a) Less than 1,1

$$Z=\frac{1,1-1,3}{0,24}=0,83$$

—> p = 0,30 or 30%

Less than 1 = 50% - 30 % = 20 %

b) More than 1,9

$$Z=\frac{1,9-1,3}{0,24}=2,5$$

—> p = 0,49 or 49%

More than 1,9 = 50% - 49% = 1%

c) Between 1 and 2

Between 1 and 2 = 39% + 50 % = 89%

$$Z=\frac{1-1,3}{0,24}=-1,25$$

—> p = 0,39 or 39%

$$Z=\frac{2-1,3}{0,24}=2,92$$

—> p = 0,50 or 50%

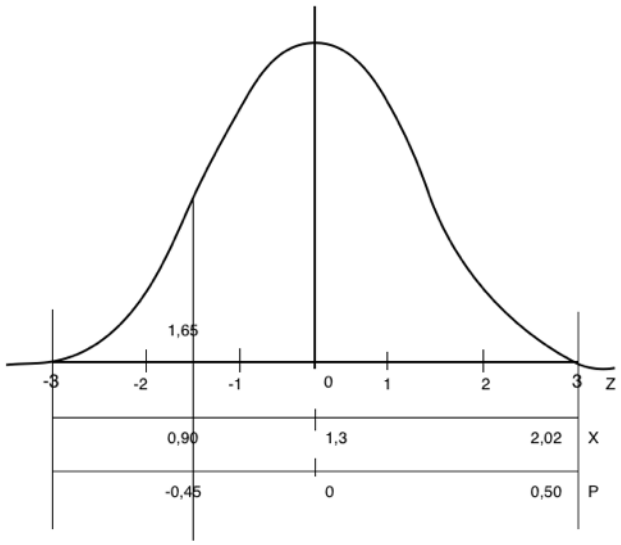
Therefore between 1 and 2 : 39%+ 50% = 89%

Question 4 : score to be in the bottom 5% of the sampling distribution

p = Z = X
p = 0,50 - 0,05 = 0,45
Z = - 1,65

X = μ ± Zσx
= 1,3 - 1,65 (0,24)
= 0,90

Therefore, we need a maximum of 0,90 to be in the bottom 5% of the population distribution



Question 5 : Highest and lowest sample means in the sampling distribution

We know that the highest and lowest same mean is equal to Z = +3 and -3
Limits for X = $\mu \pm Z\sigma X/$

The highest sample mean : 1,3 + 3 (0,24) = 1,3 + 0,72 = 2,02
The lowest sample mean : 1,3 - 3 (0,24) = 1,3 - 0,72 = 0,58