Lab 5's note

Task 1)

Import needed packages

$N = 1,000,000$ $\mu = 100$ $\sigma = 12$

Sample_size_max = 200

* Create a population, use
  np.random.normal(μ, σ, N)

* Pick a sample of size n (n run from 1 → 200)
  use random.sample(your population, n)

  Remember to convert population to a list:
  use list(your population)

* Calculate the mean of the sample
  Statistics.mean(sample)

* Calculate the confidence interval based on sample size n

$M \pm 1.96 \frac{\sigma}{\sqrt{n}}$ for 95% confidence level

$M \pm 2.58 \frac{\sigma}{\sqrt{n}}$ " 99% "

→ repeat these steps for n from 1 → 200

plot the figures

$x : -10 \rightarrow 210$

$y : 75 \rightarrow 125$

Task 2)

Import needed packages

$N = 1,000,000$ $\mu = 100$ $\sigma = 12$

* Create your population (similar to task 1)
* Calculate the population mean (result close to 100)

statistics.mean(your population)

* Sample_size : 5 or 40 or 120
* Assigning the values for z_c, depend on normal or studentT distribution

95 % (normal) → $z_c = 1.96$

99 % (normal) → $z_c = 2.58$

95 % (studentT) → size 5 → $v = 4$ → $z_c = 2.78$

99 % (studentT) → size 5 → $v = 4$ → $z_c = 4.6$

⋮

* Check if the population mean is falling in the confidence interval

+) Create sample (size of 5, or 40, 120)

+) Calculate mean and standard deviation

{ statistics.mean
  statistics.stdev

+) Calculate lower value of conf. interval

$$\mu_{lower} = \bar{X} - z_c \times \frac{\hat{s}}{\sqrt{n}}$$

+) " upper "

$$\mu_{upper} = \bar{X} + z_c \times \frac{\hat{s}}{\sqrt{n}}$$

+) Check if population mean falling in the range : $[\mu_{lower}, \mu_{upper}]$

count = count + 1

→ repeat this process 10,000

$$\text{success\_rate} = \frac{\text{count}}{10{,}000}$$

n	95%. normale	99%. normal	95%. student	99%. student
5	0.8779	0.9426	0.9509	0.9904
40	?	?	?	?
120	?	?	?	?

Due date: 12/18/20