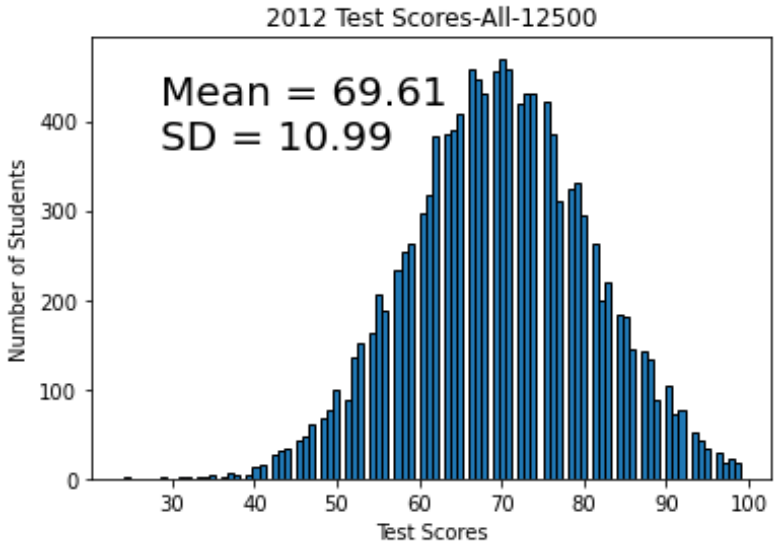
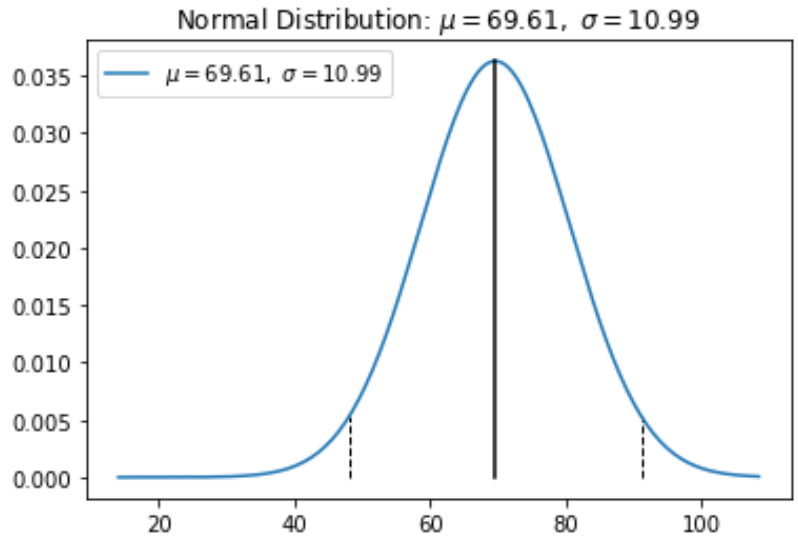
This exercise is an ***exercise*** for observing confidence interval and sampling statistics. Assume there is a national test that yields the test result of some course as in the text file *'TestScorerResult.txt'.* Please first read in the file and run an analysis to produce the following charts and texts for all the scores (the population).



For real population 12500 scores mu = 69.60832 and sigma = 10.99



(Hint: Fig1706.py)

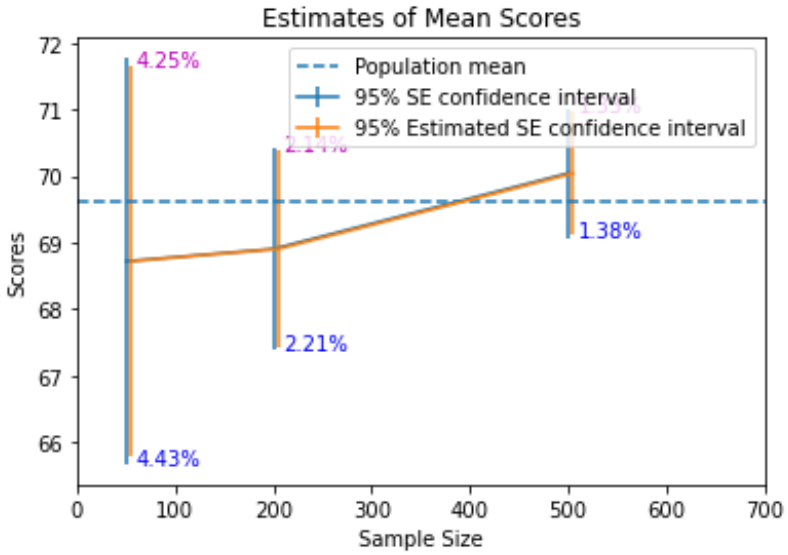
Real number of scores above 60 is: 10275 , around 82 % (Hint: count real scores)

Precise 95% number of scores between mu-1.96*sigma and mu+1.96*sigma is: 11843

Number of scores below mu-1.96*sigma (48.06) is: 364

Number of scores above mu+1.96*sigma (91.16) is: 293

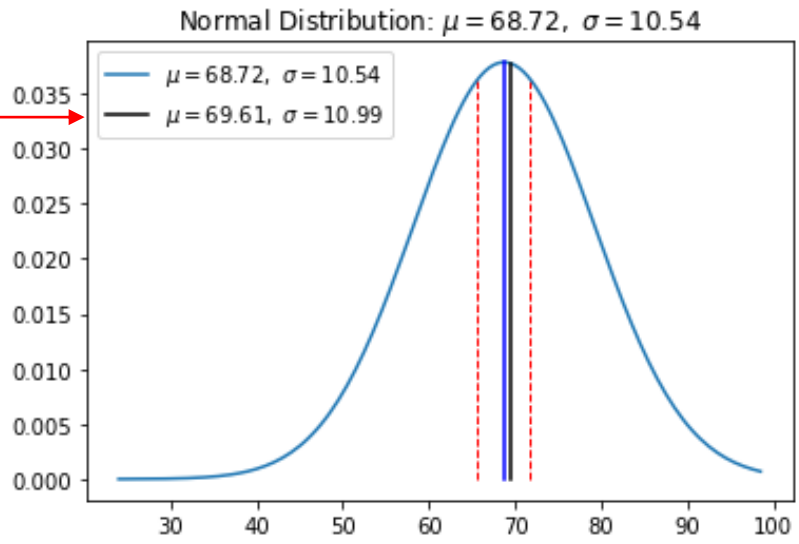
Then with three sampled sizes for 50, 200, and 500 scores, calculate their means, μ ,and standard deviations sigma σ , respectively, save them also for later uses. Please produce the following chart to show the standard errors SEs of the samples' means to the population mean. Also show both the SEs and Estimated SEs percentages calculated by population standard deviation and samples' standard deviations.



For each sampled size scores, produce the following charts and texts respectively to show how close the sample's mean is to the population mean. The black vertical line is the population mean, while the other is the sample's mean. (Hint, the **black label** can be generated by a dummy plot as:

plt.plot([],[],label=r'$\mu=%.2f,\ \sigma=%.2f$' % (mup, sigmap),color='k')

For 50 sample size scores mu = 68.72 and sigma = 10.54



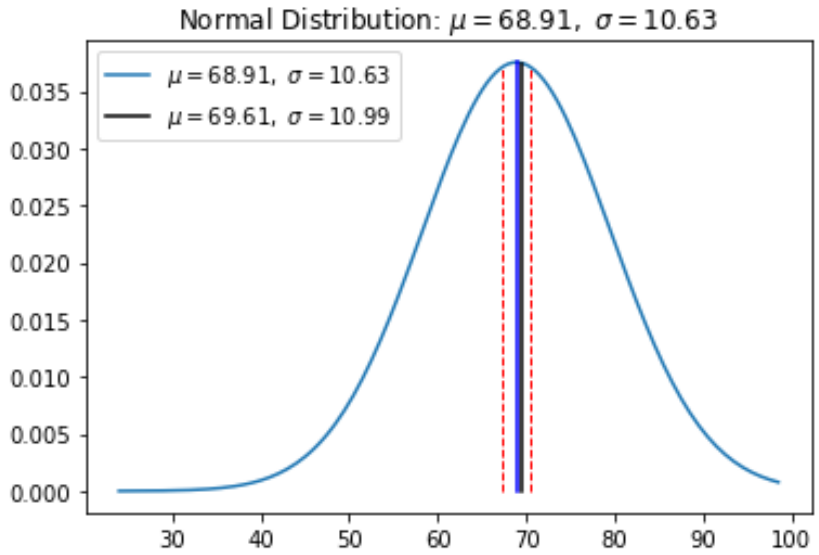
Estimated number of scores above 60 is: 9945 , around 80 % (Hint: calculated by the ratios of the pdf area from 60 above to max(scores) and the area of the whole pdf area, min(scores) to max(scores))

Estimated 95% number of scores between mu-1.96*sigma and mu+1.96*sigma is: 11665

Number of scores below mu-1.96*sigma (48.06) is: 364

Number of scores above mu+1.96*sigma (89.38) is: 471

For 200 sample size scores mu = 68.905 and sigma = 10.63



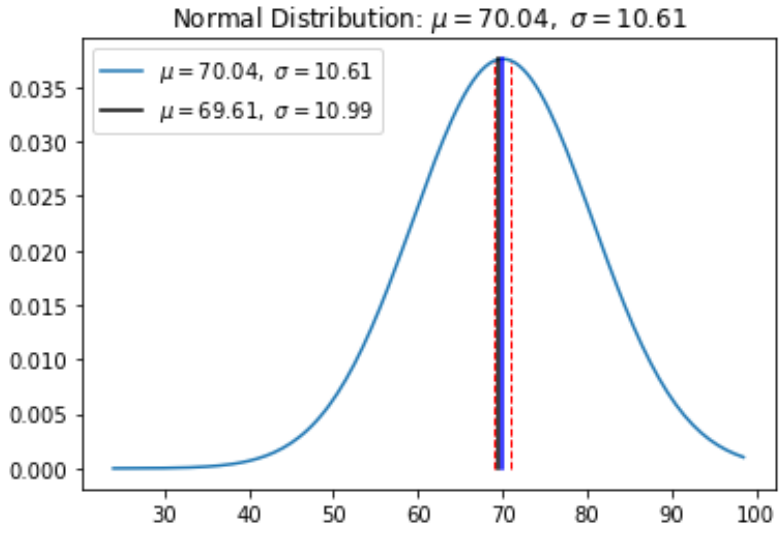
Estimated number of scores above 60 is: 9980 , around 80 %

Estimated 95% number of scores between mu-1.96*sigma and mu+1.96*sigma is: 11665

Number of scores below mu-1.96*sigma (48.07) is: 364

Number of scores above mu+1.96*sigma (89.74) is: 471

For 500 sample size scores mu = 70.04 and sigma = 10.61



Estimated number of scores above 60 is: 10342 , around 83 %

Estimated 95% number of scores between mu-1.96*sigma and mu+1.96*sigma is: 11694

Number of scores below mu-1.96*sigma (49.24) is: 440

Number of scores above mu+1.96*sigma (90.84) is: 366