Problem Set #4: CLT and Confidence Intervals

1. Fill in the blanks: According to the central limit theorem, the  *\_\_\_\_\_\_* distribution of a population will be approximately *\_\_\_\_\_\_\_\_* if n is sufficiently large (n > *30*). Also, the population parameter should be equal to the mean of the *\_\_\_\_\_\_\_\_\_\_\_\_\_* and the *\_\_\_\_\_\_\_\_\_\_\_\_* will be equal to σ/√𝑁.
2. What is the difference between:
   1. A sampling distribution
   2. A population distribution
   3. A sample distribution
3. A researcher examines the relationship between delinquent behaviors and poor verbal abilities in teenagers. They administer a verbal IQ test to a sample of 81 incarcerated juvenile delinquents, you find that the sample mean verbal IQ is 103. The verbal IQ test is known to have a *μ* = 107 and a *σ =* 15 in the general population of teenagers.
   1. Assuming that the population mean and SD for juvenile delinquents is the same as that for the general population of teenagers, what is the probability of selecting a sample with a mean of 103 or lower?
   2. Do you think that juvenile delinquents have the same population mean and SD for verbal IQ as the general population of teenagers? Explain your answer.
4. In a previous problem set, I told you that these were the number of hours of sleep that I had received each night for the past week: 6, 7, 7, 6, 7, 4.5, 8. Last time I asked you to find the mean, median, mode, variance and standard deviation for these data.
   1. Now I want you to find the 90% and 95% CI for the average number of hours I sleep per night based on the numbers I obtained for that week.
   2. Provide an interpretation of what each CI tells us