

1. The deciles of any distribution are the nine values that divide the sorted data into ten equal parts, so that each part represents 1/10 of the sample or population. How many standard deviations from the mean are the deciles that mark off the highest and lowest 10% of a normal distribution, respectively? (1.28 look up tolerance 1.28155)
2. How many standard deviations from the mean are the deciles that mark off the highest and lowest 10% of a t_{10} distribution, respectively? 1.372184
3. How many standard deviations from the mean are the deciles that mark off the highest and lowest 10% of a t_{100} distribution, respectively? 1.290075
4. Using an online calculator, you find that your 3 year old daughter has a BMI of 13.9 and are concerned that she may be underweight. Assuming the distribution of BMI of 3 year old girls is normal with $\mu = 15.4$ and $\sigma = 1.2$, determine the probability that a three year old girl has BMI ≤ 13.9 . $z = -1.25$, 0.1056 is probability
5. At a routine physical examination, you learn that your 3 year old son has a BMI of 18.5 and are shocked to hear the doctor warn you that he is overweight. Assuming the BMI of 3 year old boys is normal with $\mu = 15.6$ and $\sigma = 1.3$, explain why the doctor considers your son to be overweight. $z = 2.23$, only 1.25% of boys this age have higher BMI
6. The 2 hour oral glucose tolerance test is often used to classify individuals into three groups: “healthy” (glucose level < 140 mg/dL), diabetic (glucose level 200 mg/dL or higher), or impaired glucose tolerance without diabetes (glucose levels in between). Suppose you are studying a population in which the distribution of the glucose levels is normal with mean 100 mg/dL and standard deviation 30 mg/dL.
 - (a) What is the probability a randomly sampled person from your population has a healthy glucose level? $z = 1.33$, $p = 0.9088$
 - (b) What is the probability a randomly sampled person from your population is diabetic? $z = 3.33$, $p = 0.000429$
 - (c) What is the probability a randomly sampled person from your population has impaired glucose tolerance but is not diabetic? $p = 0.0908$
7. ALSO ASK THEM TO PICK AN INTERPRETATION OF 95% CI OPTIONS: all sorts of misinterpretations OK: after taking tons of samples of the same size, 95% of intervals would include the true pop mean μ and 5% would not OK: 95% confident this interval from your study contains the true mean OK: estimated margin of error in our estimate of mean is 0.45 NOT OK: there is a 95% chance this interval contains the true mean μ

8. Using the dataset chinayoung.dta, which contains information on BMI of participants in their 20's, calculate a 95% confidence interval for the BMI of women in this age group in the study using the normal distribution. mean 21.114, 95% CI (20.802, 21.426)
9. Using the dataset chinayoung.dta, which contains information on BMI of participants in their 20's, calculate a 99% confidence interval for the BMI of men in this age group in the study using the normal distribution. mean 22.23981, 99%CI (21.7386, 22.741)
10. Calculate and interpret a 90% confidence interval for BMI of smokers in the CHNS using the data chinayoung.dta. Given by (21.9, 22.8). MAKE LIA GRADE THIS
11. Suppose that in Chapel Hill in October, the daily high temperature follows a normal distribution with mean 72 degrees F and standard deviation 3 degrees F. Suppose that in February, the daily low temperature follows a normal distribution with mean 31 degrees F and standard deviation 5 degrees F. What would be more unusual: having a high temperature of 85 degrees in Chapel Hill on a day in October, or having a low temperature of 10 degrees in Chapel Hill on a day in February? Explain how you obtained your solution.
Oct: $z=4.33$ Feb: $z=4.2$ The high of 85 degrees in October is more unusual.
12. Based on the previous data, what is the probability that the average of the daily high temperatures for Chapel Hill for the month of October would be greater than 74 degrees?
 $\bar{X} \sim N(72, \frac{9}{31})$ $z=3.71$, 0.0001
13. Based on the previous data, what is the probability that the average of the daily high temperatures for Chapel Hill for the month of October would be in the range of 71.5-72.5 degrees? 0.6465721
14. Suppose you are designing a study of total testosterone levels in men, and suppose that in the population as a whole, total testosterone levels are normally distributed with mean 300 ng/dL and standard deviation 175 ng/dL. In your study, you have interest in estimating the mean testosterone level. How many subjects are needed in the study if you'd like to have a sample size for which 95% of the sample averages would lie within ± 0.5 standard deviations of the population mean? $n=16$
15. Suppose you are designing a study of total testosterone levels in men, and suppose that in the population as a whole, total testosterone levels are normally distributed with mean 300 ng/dL and standard deviation 175 ng/dL. In your study, you have interest in estimating the mean testosterone level. How many subjects are needed in the study if you'd like to have a sample size for which 95% of the sample averages would lie within ± 0.25 standard deviations of the population mean? $n=62$