**Statistics for decision making**

**Please use 200 words to answer the following 6 questions:**

1. What is the difference between the probability distribution of a discrete random variable and that of a continuous random variable? Let xx be a continuous random variable. What is the probability that xx assumes a single value, such as a? For a continuous probability distribution, explain why the following holds true: P(a<x<b)=P(a<x≤b)=P(a≤x<b)=P(a≤x≤b)
2. Briefly explain the main characteristics of a normal distribution. Illustrate with the help of graphs. Briefly describe the standard normal distribution curve. What are the parameters of the normal distribution?
3. How do the width and height of a normal distribution change when its mean remains the same but its standard deviation decreases? Do the width and/or height of a normal distribution change when its standard deviation remains the same but its mean increases? For the standard normal distribution, what does z represent?
4. For the standard normal distribution, find the area within one standard deviation of the mean—that is, the area between μ−σ and μ+σ. For the standard normal distribution, what is the area within 2.5 standard deviations of the mean? For the standard normal distribution, what is the area within three standard deviations of the mean?
5. Briefly explain the meaning of a population probability distribution and a sampling distribution. Give an example of each. Explain briefly the meaning of a sampling error. Give an example. Does such an error occur only in a sample survey, or can it occur in both a sample survey and a census? Explain briefly the meaning of nonsampling errors. Give an example. Do such errors occur only in a sample survey, or can they occur in both a sample survey and a census?
6. Consider the following population of 10 numbers:

20 25 13 19 9 15 11 7 17 30

1. Find the population mean.
2. Rich selected one sample of nine numbers from this population. The sample included the numbers 20, 25, 13, 9, 15, 11, 7, 17, and 30. Calculate the sample mean and sampling error for this sample.
3. Refer to part b. When Rich calculated the sample mean, he mistakenly used the numbers 20, 25, 13, 9, 15, 11, 17, 17, and 30 to calculate the sample mean. Find the sampling and nonsampling errors in this case.
4. List all samples of nine numbers (without replacement) that can be selected from this population. Calculate the sample mean and sampling error for each of these samples.