1. A poll to determine whether voters favor McKenna or Inslee for governor is conducted by standing outside the Bellevue Nordstrom store and asking every tenth customer what preference they have for governor.

(a) what kind of sampling is this?

(b) discuss problems of this sampling technique

(c) write down ideas on a better sampling technique

2. Identify with a few words what each quantity represents.
   
   • \( r \)
   
   • \( \bar{x} \)
   
   • \( s \)
   
   • \( \hat{p} \)

3. Describe the difference between quantities called statistics and quantities called parameters.

4. A researcher claims that children in Washington are healthier than children in Oregon. If in fact Washington children are no healthier than their Oregon counterparts, has the researcher made a type I or a type II error?
5. **True or False**: The smaller the $P$-value, the more likely it is that the null hypothesis is false.

6. Quiz scores in a class of 100 were as follows: 20 students had a perfect score of 8, followed by 10 students with a score of 6, and finally 70 students had a score of 5.
   
   (a) what is the median score?

   (b) what is the (weighted) mean quiz score?

7. In the class of 100 students, there are 60 women and 40 men. A team of two students is selected at random to solve problems on the whiteboard. First one student is selected, then a second is selected (so there’s no replacement!)

   Let $F$ be the event that a women is selected in the first round, and let $S$ be the event that a women is selected in the second round.

   (a) describe the complementary event to $F$

   (b) are $F$ and $S$ independent events?

   (c) are $F$ and $S$ mutually exclusive events?

8. Calculate the $z$-score for $x = 24$ cm when the mean $\mu = 30$ cm and the standard deviation $\sigma = 5$ cm.

9. A coin is tossed (with heads or tails as outcomes) and a six-sided die is rolled (with outcomes of 1,2,3,4,5, or 6). Describe the sample space of all possible outcomes of the coin toss and die roll.
10. The lengths of a hospital’s 1000 newborns are normally distributed, with a mean length of 21 inches and a standard deviation of 2 inches.

(a) what percentage of the lengths are above 23 inches?

(b) how many newborns would be expected to have lengths between 18 and 19 inches?

11. Samples of \( n = 64 \) newborns are selected from the 1000 newborns of the previous problem. The population mean and population standard deviation of newborn lengths are as in the previous problem.

(a) what is the mean of the sample means?

(b) what is the standard deviation of the sample means?

12. Twenty coins are dumped out of a jar. What is the probability that 12 coins have heads facing up, and the other 8 have tails facing up?

13. License plates in a certain state have the format three letters followed by four numbers, for example \( BAC \ 9885 \). How many different license plates are possible with this format?

14. How many different re-arrangements are possible for the letters in the word \( SEATTLE \)?
15. A sample of 10 heights (in cm) is selected from a larger population:

   165, 165, 175, 175, 175, 185, 185, 185, 185, 195

Use this data to calculate sample’s

(a) median

(b) first quartile

(c) range

(d) mean

(e) standard deviation

16. Sketch a histogram of the heights in the previous problem, using as class boundaries 160, 170, 180, 190, and 200.

17. If I roll two six-sided dice, what is the probability that at least one of the dice rolls to a five?
18. Employee satisfaction numbers were put on a scale from 0 to 100. In a survey of 400 employees in a company of 10,000, it was found that the mean satisfaction was $\bar{x}_1 = 56$, with a standard deviation $s_1 = 7$. Construct a 95% confidence-interval for the mean satisfaction number for all 10,000 employees.

19. A second company with 20,000 employees conducts the same employee satisfaction survey on a group of 900 employees. This company found that the mean satisfaction number was $\bar{x}_2 = 57$, with a standard deviation of $s_2 = 9$.

The claim is made that the mean satisfaction number for the second company’s entire population is greater than the mean satisfaction number for the first company’s entire population. (the first company refers to the company of the previous problem)

(a) state the null & alternative hypotheses

(b) estimate the standard deviation of the difference of sample means

(c) does the data support the claim that the second company’s employees are more satisfied than the first company’s employees, to a level of significance $\alpha = 0.05$ ?
20. Given the data below

(a) draw a best-fit line (no need to calculate the least-squares line)

(b) find an equation for your best-fit line

(c) estimate the value of the (Pearson) correlation coefficient for this set of data.

21. In a group of 100 people, there were 26 tall people, 15 with brown eyes, and 10 tall people with brown eyes. (the 10 people are included in the numbers for the tall & brown-eyed categories)

(a) If I choose a person at random from the group of 100, what is the probability that they have brown eyes or are tall?

(b) Compute the conditional probability that someone is tall given the information that they have brown eyes.