

1. With a mean of 40 and a standard deviation of 4, find the Z score for a score of 45.

2. What proportion of the area under the standard normal curve would you expect to be between $z = 1.2$ and $z = 0.6$

3. What proportion of the area under the standard normal curve would you expect to be below $z = -2.6$.

4. If a class's scores were normally distributed with a mean of 70 and a standard deviation of 10, what are the upper and lower limits of the middle 68% of the class? What are the upper and lower limits of the middle 95% of the class?

5. Jason's time in the 10-K run was 40 minutes. His z-score was -3. If the raw score standard deviation was 5, the mean running time for the competitors was_____.

6. For each of the following z scores, what is the area between the mean and each z score?

0.40

1.01

-1.48

-1.89

2.53

7. For each of the following z scores, what is the area beyond the z score in the tail?

0.63

-1.65

1.94

-2.27

2.80

8. For a distribution with a mean = 50 and standard deviation = 5, find the z-scores for each of the following raw scores:

50; 65; 45; 42

9. Suppose a pizza place claims its average pizza delivery time is 30 minutes, but you believe it takes long than that. What are your null and alternative hypotheses?

10. If the mean of a sample that contains 25 participants is equal to 82, the population mean is equal to 79 with a standard deviation of 15, what is the value of Z_{obt} ?

11. We test a technique for changing reading comprehension. Without it, the population mean on a reading test is 220 with a standard deviation of 15. An sample of 25 participants has a mean of 211.55. Use a Z test and **the 10 step process** to determine if the technique changes reading comprehension scores.

12. We predict that learning statistics will increase a student's IQ. Those not learning statistics have a population mean of 100 with a standard deviation of 15. For 25 statistics students, the mean is equal to 108.6. Use a Z test and **the 10 step process** to determine if learning statistics increases a student's IQ.

13. In a test of physical fitness, a group of men ages 65 and older from a local retirement community were told to do as many sit-ups as they could. It is known that the population mean is 20 with a standard deviation of 8. The scores for the men from the retirement community are given below. What should you conclude?

24 24 10 23 18 29 47 32 19 24 20
28 21 20 27 25

14. Suppose a pizza place claims its average pizza delivery time is 30 minutes, but you believe it takes longer than that. What are your null and alternative hypotheses?

15. If the mean is equal to 82, the $\mu = 79$, the standard deviation = 15, and $N=25$, what is the value of Z_{obt} ?

16. If the mean is equal to 53, $\mu = 51$, the standard deviation = 10, and $N=15$, what is the value of Z_{obt} ?

17. We test a technique for changing reading comprehension. Without it, the μ on a reading test is 220, $\sigma_x = 15$. An N of 25 participants has a mean of 211.55. Use a Z test and the 10 step process to determine if the technique changes reading comprehension scores.

18. We predict that learning statistics will increase a student's IQ. Those not learning statistics have $\mu = 100$ and $\sigma_x = 15$. For 25 statistics students, the mean = 108.6. Use a Z test and the 10 step process to determine if learning statistics increases a student's IQ.

19. Jeri has conducted a study on the average salary of recent graduates in her major at State College. She has randomly selected and surveyed 25 recent graduates from her program. The annual average income of this sample of recent graduates is \$34,000. Jeri knows that the population mean income for recent graduates in her area of study is \$31,000 with a standard deviation of \$6,000. If she uses an alpha of .05 and a two-tailed test, what is her conclusion?

20. The Physical Fitness Test (National Level for Girls) shows the national average for 10-year-old girls on "right-angle push-ups" to be = 13. Principal Smyth hypothesizes that her girls at Strong School are significantly above the national mean. If the standard deviation = 6 and the scores for nine girls are as reported here, compute z (obt.) and determine if Principal Smyth is right. Use an alpha of .05.

14 16 18 16 12 16 17 20 15

21. Martha believes that a relaxation technique involving visualization will help people with mild insomnia fall asleep faster. She randomly selects a sample of 20 participants from a group of mild insomnia patients and randomly assigns 10 to receive visualization therapy. The other 10 participants receive no treatment. Each participant then is measured to see how long (in minutes) it takes him or her to fall asleep. Her data are shown below.

No Treatment	Treatment
22	10
18	17
27	24
20	21
23	27
26	21
27	23
22	18
24	19
22	22

Which t test should she use?

Using the fact that Martha believes the treatment will reduce the amount of time to fall asleep, state the null and alternative hypotheses.

22. Martha believes that a relaxation technique involving visualization will help people with mild insomnia fall asleep faster. She randomly selects 10 participants from a group of mild insomnia patients and measures how long (in minutes) it takes each one to fall asleep. Each participant is then taught the visualization technique and measured again to see how long it takes him or her to fall asleep. Her data are shown below.

No Treatment	Treatment
22	10
18	17
27	24
20	21
23	27
26	21
27	23
22	18
24	19
22	22

Using an $\alpha = 0.05$, what is t_{crit} ?

Using SPSS, calculate t_{obt} .

In plain English, what should Martha conclude?

23. We ask whether people will score higher or lower on a questionnaire of their well-being when they are exposed to sunshine compared to when they're not exposed to sunshine. A sample of 8 people is first measured after low levels of sunshine exposure and then again after high levels of exposure. We get the following pairs of scores:

Low: 14 13 17 15 18 17 14 16

High: 18 12 20 19 22 19 19 16

Which t test should we use?

What are the independent and dependent variables?

State the null and alternative hypotheses.

Using an $\alpha = 0.05$, what is t_{crit} ?

Using SPSS, calculate t_{obt} .

What should you conclude?

24. We investigate the effects of sensitivity training on a policeman's effectiveness at resolving domestic disputes (comparing independent samples of policemen who had or had not completed the training). The dependent variable was their ability to successfully resolve domestic disputes. The following scores were obtained:

No course	Course
11	13
14	16
10	14
12	17
8	11
15	14
12	15
13	18
9	12
11	11

Which t test should we use?

What are the independent and dependent variables?

State the null and alternative hypotheses.

Using an alpha = 0.05, what is t (crit)?

Using SPSS, calculate t (obt.)

What should you conclude?

25. Renee is studying the effect of positive reinforcement for her psychology class. She assigns 16 pigeons to two different positive reinforcement schedules. After training the pigeons, she measures the number of correct responses by each in 10 trials. Using a two-tailed test and $\alpha = 0.05$, use the data below to determine whether or not there is a difference between the two schedules.

Reinforcement Schedule A	Reinforcement Schedule B
6	5
8	8
5	4
7	6
4	3
7	7
6	6
8	4

Which t test should she use?

Using an $\alpha = 0.05$, what is t (crit)?

Using SPSS, calculate t (obt.).

In plain English, what should Renee conclude?

26. Renee is studying the effect of positive reinforcement for her psychology class. She gets 16 pigeons. These pigeons are from eight egg clutches with two pigeons from each clutch. Renee matches each pigeon in Reinforcement Schedule A with its clutchmate in Reinforcement Schedule B. After training the pigeons, she measures the number of correct responses by each in 10 trials. Using a two-tailed test and $\alpha = 0.05$, use the data below to determine whether or not there is a difference between the two schedules.

Reinforcement Schedule A	Reinforcement Schedule B
6	5
8	8
5	4
7	6
4	3
7	7
6	6
8	4

Which t test should she use?

Using an $\alpha = 0.05$, what is t (crit)?

Using SPSS, calculate t (obt.).

In plain English, what should Renee conclude?