

Directions:

- Read the problem carefully and answer each question.
- You may use technology for most computations except when otherwise indicated.
- You will be allowed to use a packet of materials that includes formulas and tables.
- Show all your steps for full credit.

- In a survey, 26 voters were asked their ages. The results are shown below. Construct a histogram to represent the data (beginning with a lower class limit of 20 and a class width of 10).
 - Describe the shape of the graph.
 - Using the graph, what is the approximate median number of study hours per week? What is the approximate mean number of study hours per week?

43	56	28	63	67	66	52	48	37	51	40	60	62
66	45	21	35	49	32	53	61	53	69	31	48	59

- Listed below are the amounts of weight change (in pounds) for 9 women during their first year of work after graduating from college. Positive values correspond to women who gained weight and negative values correspond to women who lost weight. What is the median weight change?

2	4	-6	5	-7	-4	-5	3	5
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- Using the formula, find the standard deviation for the given sample data. Round your answer to one more decimal place than is present in the original data. Use a calculator as needed for intermediate steps, but for full credit show all your work otherwise. Three randomly selected organic chemistry midterms were selected as follows. 90, 89, 64
- Find the probability of correctly answering the first 5 questions on a multiple choice test if random guesses are made and each question has 4 possible answers.
- Find the indicated probability. Express your answer as a simplified fraction unless otherwise noted. Show your work for full credit. The table below shows the soft drinks preferences of people in three age groups. If one of the 255 subjects is randomly selected, find the probability that the person is
 - over 40 and drinks cola.
 - over 40 or drinks cola.
 - over 40 given that they drink cola.

	Cola	Root Beer	Lemon-Lime
Under 21 years of age	40	25	20
Between 21 and 40	35	20	30
Over 40 years of age	20	30	35

6. Solve the problem. Use technology to help you find the answer. 8 basketball players are to be selected to play in a special game. The players will be selected from a list of 27 players. If the players are selected randomly, what is the probability that the 8 tallest players will be selected?

7. Solve the problem. Write down the formula used and use technology to find the answer. A tourist in France wants to visit 5 of 8 different cities. How many different routes are possible?

8. The lifespan of car batteries is normally distributed, with a mean of 24 months and a standard deviation of 6 months. A car battery is selected at random.
 - A. Find the probability that the lifespan of the battery is between 20 and 28 months
 - B. What is the shortest life expectancy a car battery can have and still be in the top 5% of life expectancies?

9. A history pop quiz asks students to arrange the following presidents in chronological order: Hayes, Taft, Polk, Taylor, Grant, Pierce. If an unprepared student totally guesses, what is the probability of guessing correctly?

10. In a random sample of 49 computers, the mean repair cost was \$100 with a standard deviation of \$20.
 - A. Construct the 99% confidence interval for the population mean repair cost.
 - B. If the level of confidence was lowered to 90%, what will be the effect on the confidence interval?

11. A science teacher claims that the mean scores on a science assessment test for 4th grade boys are higher than for girls. The mean score for 20 randomly selected boys is 80 with a st. dev. of 10, and the mean score for 10 randomly selected girls is 90 with a standard deviation of 10. At $\alpha = .01$, can you reject the teacher's claim? Assume the populations are normally distributed and the variances are not equal.

12. Construct the cumulative frequency distribution that corresponds to the given frequency distribution.

Speed	Number of cars
0-29	4
30-59	16
60-89	60
90-119	20

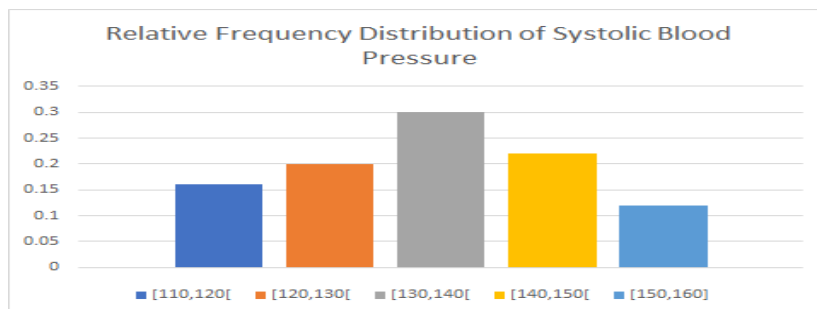
13. On a math test, the scores of 24 students were

97 75 74 61 74 74 97 89 74 63 84 75 75 84 74 75 84 74 75 89 75 84 89 61

Construct a frequency distribution. Use 4 classes beginning with a lower class limit of 60. Graph it as a histogram and describe its shape.

Score	Frequency

14. A nurse measured the blood pressure of each person who visited her clinic. The following is a relative-frequency histogram for the systolic blood pressure readings for those people aged between 25 and 40. The blood pressure readings were given to the nearest whole number. Approximately what percentage of the people aged 25-40 had a systolic blood pressure reading between 120 and 139 inclusive?



15. The test scores of 30 students are summarized in the frequency distribution below. Find the mean score.

Score	Students
50-59	3
60-69	7
70-79	4
80-89	11
90-99	5

16. The race speeds in mph for the top eight cars in a 200-mile race are listed below. Use the range rule of thumb to estimate the standard deviation. Round results to the nearest tenth. You may use the standard deviation function on the calculator.

176.9 178.9 189.2 181.7 175.6 178.0 177.5 186.0

17. From the information provided, create the sample space of possible outcomes. Both Fred and Ed have a bag of candy containing a lemon drop, a cherry drop, and a lollipop. Each takes out a piece and eats it. What are the possible pairs of candies eaten?

18. Find the probability of correctly answering the first 5 questions on a multiple choice test if random guesses are made and each question has 4 possible answers.

19. A sample of 4 different calculators is randomly selected from a group containing 20 that are defective and 38 that have no defects. What is the probability that at least one of the calculators is defective? Round to the nearest thousandth. Show your work.

20. State whether the following is a probability distribution. If not, identify the requirement that is not satisfied.

x	P(x)
0	0.29
1	0.21
2	0.09
3	0.36
4	0.05

21. State whether the following is a probability distribution. If it does, find the mean and the standard deviation. If not, identify the requirement that is not satisfied. If a person is randomly selected from a certain town, the probability distribution For the number, x , of siblings is as described in the accompanying table.

x	P(x)
0	0.25
1	0.32
2	0.22
3	0.10
4	0.05
5	0.04

22. In a certain town, 30% of adults have a college degree. The accompanying table describes the probability distribution for the number of adults (among 4 randomly selected adults) who have a college degree. Find the mean [and standard deviation] of the given probability distribution.

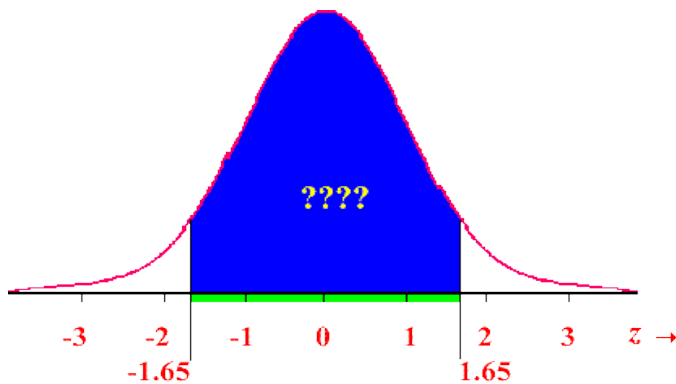
x	P(x)
0	0.2401
1	0.4116
2	0.2646
3	0.0756
4	0.0081

23. Assume that a researcher randomly selects 14 newborn babies and counts the number of girls selected, x . The probabilities corresponding to the 14 possible values of x are summarized in the given table. Answer the question using the table.

x(girls)	P(x)	x(girls)	P(x)	x(girls)	P(x)
0	0.000	5	0.122	10	0.061
1	0.001	6	0.183	11	0.022
2	0.006	7	0.209	12	0.006
3	0.022	8	0.183	13	0.001
4	0.061	9	0.122	14	0.000

- A. Find the probability of selecting exactly 4 girls.
 B. Find the probability of selecting 12 or more girls.
24. Assume that a procedure yields a binomial distribution with a trial repeated n times. Use the binomial probability formula to find the probability of x successes given the probability p of success on a single trial. Round to three decimal places.
 $n = 5, x = 2, p = 0.70$
25. A tennis player makes a successful first serve 51% of the time. If she serves 9 times, what is the probability that she gets exactly 3 first serves in? Assume that each serve is independent of the others.

26. Find the area of the shaded region. The graph depicts the standard normal distribution with mean 0 and standard deviation 1.



27. If z is a standard normal variable, find the probability: The probability that z is greater than -1.82
28. The Precision Scientific Instrument Company manufactures thermometers that are supposed to give readings of 0°C at the freezing point of water. Tests on a large sample of these thermometers reveal that at the freezing point of water, some give readings below 0°C (denoted by negative numbers) and some give readings above 0°C (denoted by positive numbers). Assume that the mean reading is in 0°C and the standard deviation of the readings is 1.00°C . Also assume that the frequency distribution of errors closely resembles the normal distribution. A thermometer is randomly selected and tested. Find the temperature reading corresponding to the given information. Find Q3, the third quartile.
29. Human body temperatures are normally distributed with a mean of 98.20°F and a standard deviation of 0.62°F . Find the temperature that separates the top 7% from the bottom 93%. Round to the nearest hundredth of a degree.
30. The annual precipitation amounts in a certain mountain range are normally distributed with a mean of 109 inches, and a standard deviation of 10 inches. What is the probability that the mean annual precipitation during 25 randomly picked years will be less than 111.8 inches?
31. Use the given degree of confidence and sample data to construct a confidence interval for the population proportion p : $n = 56$, $x = 30$; 95% confidence.
32. Use the given degree of confidence and sample data to construct a confidence interval for the population mean μ . Assume that the population has a normal distribution.
 $n = 30$, $\bar{x} = 84.6$, $s = 10.5$, 90% confidence
33. The football coach randomly selected ten players and timed how long each player took to perform a certain drill. Determine a 95% confidence interval for the mean time for all players. The times (in minutes) were: 7.0 10.8 9.5 8.0 11.5 7.5 6.4 11.3 10.2 12.6
34. Assume that a hypothesis test of the given claim will be conducted. A medical researcher claims that 10% of children suffer from a certain disorder. Identify the type I error for the test.

35. In a clinical study of an allergy drug, 108 of the 202 subjects reported experiencing significant relief from their symptoms. At the 0.01 significance level, test the claim that more than half of all those using the drug experience relief. Identify the null hypothesis, alternative hypothesis, test statistic, P-value, conclusion about the null hypothesis, and final conclusion that addresses the original claim.
36. In a sample of 47 adults selected randomly from one town, it is found that 9 of them have been exposed to a particular strain of the flu. Find the P-value for a test of the claim that the proportion of all adults in the town that have been exposed to this strain of the flu is 8%. Find the P-value for the indicated hypothesis test.
37. A cereal company claims that the mean weight of the cereal in its packets is 14oz. The weight (in ounces) of the cereal in a random sample of 8 of its cereal packets are listed:
12.4 14.6 13.5 13.8 14.1 13.7 14.0 14.4 13.6 14.2 12.9 13.5 12.9 13.2
Test the claim at the 0.01 significance level. Assume that a simple random sample has been selected from a normally distributed population and test the given claim. Use either the traditional (critical value) method or P-value method as indicated. Identify the null and alternative hypotheses, test statistic, critical value(s) or P-value (or range of P-values) as appropriate, and state the final conclusion that addresses the original claim.
38. The mean resting pulse rate for men is 72 beats per minute. A simple random sample of men who regularly work out at Mitch's Gym is obtained and their resting pulse rates (in beats per minute) are listed below. Assume that the standard deviation of the resting pulse rates of all men who work out at Mitch's Gym is known to be 6.6 beats per minute. Use a 0.05 significance level to test the claim that these sample pulse rates come from a population with a mean less than 72 beats per minute. Identify the null hypothesis, alternative hypothesis, test statistic, critical value(s), conclusion about the null hypothesis, and final conclusion that addresses the original claim. Use the traditional (critical value) method of testing hypotheses.
54 59 69 84 74 64 69 70 66 80 59 71 76 63
39. Two samples of healthy women ages 18-40 were given bags of potato chips and invited to snack on them freely. The first sample included 11 woman trying to restrain their diet out of concern about their weight. The second sample of 9 woman were not pre-conditioned in this way. Use a .05 significance level to test the claim that their intentions had an effect on their eating habits. The table below summarizes data on grams of potato chips consumed. (Do not assume equal variances in the populations; i.e. do not use the pooled variance procedure). Use the P-value method. Identify the null and alternative hypotheses, test statistic, P-value, and state the final conclusion that addresses the original claim.

Group	n	Sample Mean	Standard Deviation
Restrained	11	32	33.17
Unrestrained	9	59	21

40. The paired data below consist of the test scores of 5 randomly selected students and the number of hours they studied for the test.

Hours	10	4	6	10	9
Score	86	69	86	59	87

- Find the value of the linear correlation coefficient r and interpret it.
- Using the linear correlation coefficient r and the sample size n , determine the critical values of r and use your finding to state whether or not the given r represents a significant linear correlation. Use a significance level of 0.05.
- Find the equation of the regression line (line of best fit). Round the final values to three significant digits, if necessary.
- Using the regression line, what is the best predicted value of the test score for 8.25 hours?