Tony's Research

Exercises

Descriptive Statistics

Inference Statistics

***Section 1.0*:** Basic Math and Scales of Measurements

Exercises 1.0

1. Indicate whether the tasks described would involve nominal, ordinal, interval, or ratio scaling.
   a. Measuring the time (to nearest second) for a 1-mile run.
   b. Assigning room numbers at a new motel.
   c. Measuring Square footage in classrooms at an elementary school.
   d. Assigning grades on a multiple choice test taken by a class in Canadian History.
   e. Ranking a French poodle as the best of breed at a dog show.
   f. Explaining the Fahrenheit temperature scale.
   g. Choosing the best cherry pie from 5 entries at the country fair.
   h. Distributing automobile license plate numbers at a motor vehicle office.
2. Classify the following types of data as nominal, ordinal, interval, or ratio.
   a. Fourth graders at an school who have not had chicken pox.
   b. Number of items correct for 27 students on a mathematics test.
   c. Time required depressing the brake pedal in a driving simulator after consuming 3 ounces of alcohol in 30 minutes.
   d. Tags with pet identification numbers distributed after rabies vaccination.
   e. Daily high temperatures for the month of August in degrees Celsius.
   f. Position at the finish line for the first four runners in a 1500-meter race.
   g. List of heights of 52 Colorado mountain peaks that are over 14,000 feet.
3. Compute the following intervals:
   a. $I_{Low} = 40 - 2.36(v7)$
   b. $I_{High} = 40 + 2.36(v7)$
4. Solve for M in the following equation:

$$-0.84 = \frac{M - 50}{3}$$

5. $16 + (15 - 8) * 5 - 2 =$
6. $7^2 + 1 * 2 =$
7. $2^3 + 3 * 2 + 15/3 =$
8. For the sample data

X	***Y***
5	4
4	3
6	2
3	1
2	0

   Compute the following:
   a. $\sum X$
   b. $\sum X^2$
   c. $\sum XY$
9. Use a computational table to find
   a. $\sum(X - 12)$ for $X = 13, 12, 8, 14, 9$
   b. What is $\sum(X - 11.2)$
10. Given the following: $\sum X = 20$ and $\sum XY = 40$, find
    a. $(\sum X)^2$
    b. $\sum X(\sum XY)$
    c. M if $X = \{2, 5, M, 7, 3\}$
11. Compute the 4 decimal places the following:
    a. 3*0.2347
    b. $(0.2347)^2$
    c. (0.2347)(0.4831)
12. Given $\sum X = 12$, $\sum Y = 25$, $\sum XY = 360$, compute

$$\frac{\sum XY - \sum X(\sum Y)}{(\sum Y)^2 - \sum Y}$$

***Section 2.1*:** Exercises on Central Tendency

Exercises 2.1

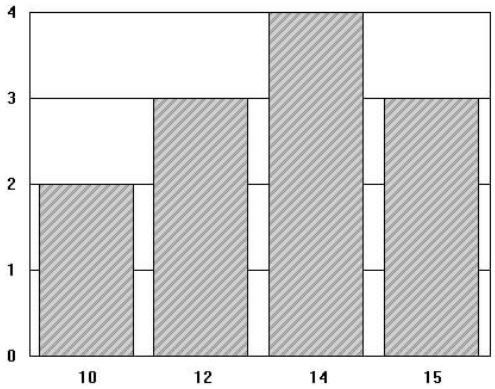
1. Calculate the mean, median, and mode for each data.
    a. -8, -5, -4, -2, 0, 3, 4, 6, 8, 8
    b. 0.24, 0.34, 0.34, 0.45, 0.62, 0.71
    c. 0, 1, 1, 3, 4, 5, 5, 7, 8, 9, 10
2. Calculate the mean, median, and mode for each data.
    a. v2, v3, v3, v5, v7, v11, v13
    b. 22, 33, 11, 33, 44, 55, 11, 66
    c. -1, 0, 1, -1, 1, 1, 0, -1, 0, 1
3. The grade-point average (GPA) is determined by the sum of the product of the credits taken and the corresponding grade score divided by the total credits. Compute the GPA for Tom's grades for fall 2006. (A = 4 points, B = 3, C = 2, D = 1, F = 0)

Course	Credits	Grade
English	3	A
Mathematics	4	C
Biology	4	B
History	2	D
Spanish	3	C

4. Becky's quiz scores are 65, 80, 85, 78, and 68. What score must she get on her next quiz to bring her average to 80?
5. When 25 students took the midterm exam, the average score was 78. Two more students took the exam and the sum of their scores was 154. What is the new average for the midterm?
6. 20 Respondents were asked to rank their preferences for three kinds of meal; from the result below, compute the mean, mode, and median for scores of ranks for each kind of meal.

Rank	Meal 1	Meal 2	Meal 3
5	3	5	2
10	2	3	5

7. Twenty-seven students averaged 80 on their midterm exam. Could twenty of them have scored above 90? Explain.
8. Which statistics is the best measure of central tendency for data that contain extreme scores? Explain.
9. Compute the median for the following data. Show work.
    a. 10, 12, 14, 8, 11, 17
    b. 2, 1, 4, 5, 4, 6, 2
10. Compute the mean, mode and median from the frequency histogram below:



11. Compute the mean, median and mode for the following data.

12	14	15	12	11
10	10	12	10	9
15	8	15	8	12
13	13	12	11	11
9	11	12	10	13

12. Compute the mean and median for X, Y, and $(X - 3)$ from the data below:

X	Y
1	1
3	0
4	2
1	3
2	4
5	5
6	3
3	2
2	1

***Section 2.2*:** Exercises on Frequency

Exercises 2.2

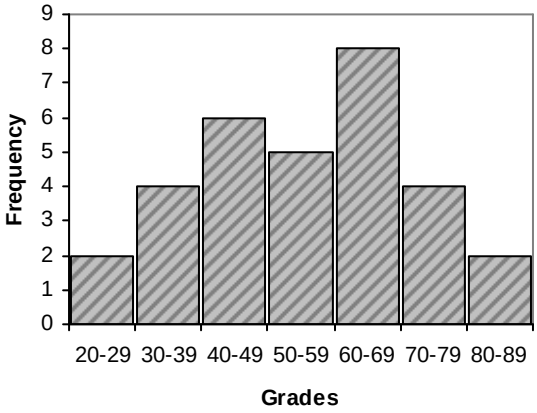
1. A group of 30 students' scores are listed below. Construct a frequency table showing relative and cumulative frequency by class intervals of 10 (71 – 80, 81 – 90, etc.):

63	76	82	85	65	95
92	76	80	72	76	80
78	72	69	92	72	74
85	58	86	76	74	67
78	88	93	80	70	98

2. Group the following data into class intervals of 2 and compute the:
   a. Relative and cumulative frequencies
   b. Median from part a
   c. Mean from part a

17.0	18.1	19.2	20.2	21.1
15.8	22.0	16.1	15.9	18.2
18.5	22.0	16.3	20.3	16.3
20.3	20.9	18.5	22.1	21.4
17.5	19.4	21.8	16.4	20.9

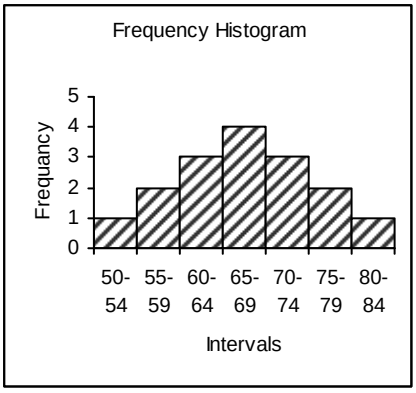
3. The following frequency histogram shows the number of students' scores between various grade intervals on a science exam. Construct the relative and cumulative frequency table and compute the mean grades for the exam.



4. From the frequency table below do the following:
   a. Construct a histogram
   b. Compute the mean
   c. Compute the median
   d. Compute the 75 percentile

Class	Frequency
90-99	4
80-89	6
70-79	8
60-69	5
50-59	3

5. From the following frequency histogram. Construct the relative and cumulative frequency table and compute the mean and median.



6. Compute the mean and median for the data shown below.

Class	Frequency
70-79	4
60-69	6
50-59	8
40-49	5
30-39	3

7. Compute the means for
   a. $\sum X = 232$ and $N = 5$
   b. $\sum f_i X_i = 400$ and $\sum f_i = 25$

***Section 2.3*:** Exercises on Stem and Leaf

Exercises 2.3

1. Make a stem and leaf display, grouping the data into intervals of 10 (60 - 69, 70 -79, etc.).

63	76	82	85	65	95
92	76	80	72	76	80
78	72	69	92	72	74
85	58	86	76	74	67
78	88	93	80	70	98

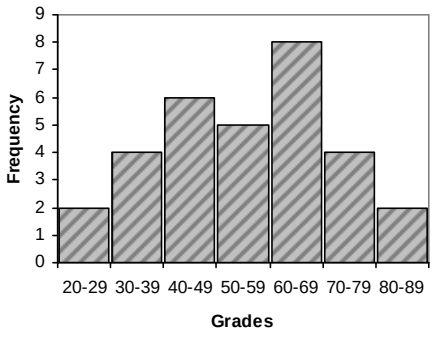
2. Make a stem and leaf display for the weights of children in kilograms. Use two-digit stems.

17.0	18.1	19.2	20.2	21.1
15.8	22.0	16.1	15.9	18.2
18.5	22.0	16.3	20.3	16.3
20.3	20.9	18.5	22.1	21.4
17.5	19.4	21.8	16.4	20.9

3. Consider the following stem and leaf display, where the stems are the tens digits of the data.
   a. Construct a histogram
   b. Compute the median

3 | 0 1 1 2
4 | 1 2 3 4 4
5 | 2 3 3 4 5 6 7
6 | 1 1 2 4 4
7 | 2 2 3 3

4. Use the midpoint of class interval to construct a equivalent stem and leaf display from the histogram below.



5. Reconstruct the stem and leaf display below using a class interval of 5 instead of 10 as shown.

3 | 0 1 1 1 2 7 8
4 | 2 4 5 6 7 8 8 9
5 | 3 3 3 3 4 5 6 7 8
6 | 1 1 2 4 4 5
7 | 1 1 2 2 7 8 9

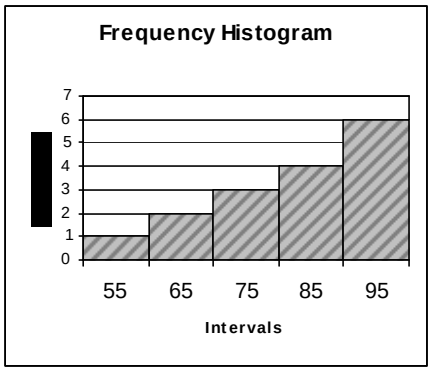
6. Make a stem and leaf display, grouping the data into intervals of 10.

64	74	46	75
84	72	57	83
77	85	84	88
92	85	95	95
86	86	92	90

7. Convert the data below into a stem and leaf display. (Leaves will be 0).

X	Frequency
100	2
80	4
60	7
40	5
20	2

8. From the histogram showing the frequencies of the midpoint of *X*:
   a. Make a stem and leaf display using a one-digit stem
   b. Compute the mean
   c. Compute the median



***Section 3.1*:** Exercises on Variability

Exercises 3.1

1. Compute the median, variance, and standard deviation for the data below:

63	76	82	85	65	95
92	76	80	72	76	80
78	72	69	92	72	74
85	58	86	76	74	67
78	88	93	80	70	98

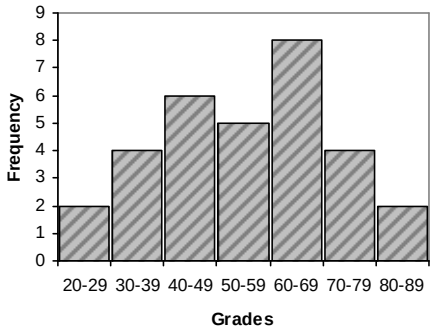
2. Compute range, variance and IQR (Q2 – Q1) for the data below:

64	74	46	75
84	72	57	83
77	85	84	88
92	85	95	95
86	86	92	90

3. Compute the mean, range, variance and standard deviation for the data below:

1. | 0 1 1 2
2. | 1 2 3 4 4
3. | 2 3 3 4 5 6 7
4. | 1 1 2 4 4
5. | 2 2 3 3

6. Compute the variance and standard deviation for data summarized below:



7. Use computational formulas to find the variance and standard deviations for

a. -8, -5, -4, -2, 0, 3, 4, 6, 8, 8
b. 0.24, 0.34, 0.34, 0.45, 0.62, 0.71
c. 0, 1, 1, 3, 4, 5, 5, 7, 8, 9, 10

8. Compute the variance, range and IQR from the frequency table below:

X	Frequency
100	2
80	4
60	7
40	5
20	2

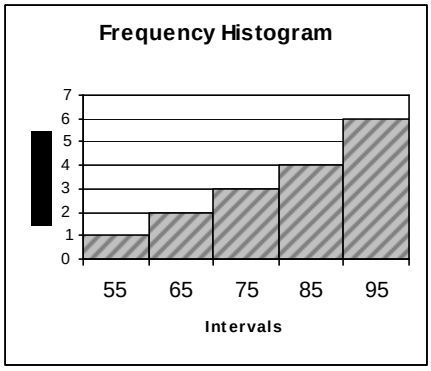
9. Find the range, variance, and semi-interquartile range from table below:

Class	Frequency
90-99	4
80-89	6
70-79	8
60-69	5
50-59	3

10. Compute the range and standard deviation for

Class	Frequency
70-79	4
60-69	6
50-59	8
40-49	5
30-39	3

11. Compute the range, variance, and IQR from the data summarized below



***Section 5.1*:** Exercises on Pearson Correlation

Exercises 5.1

1. The U.S. National Center for Educational Statistics average cost of tuition and fees at U.S. four-year college are shown in the table below.

Year	Public	Private
1989	1846	9451
1990	2035	10348
1991	2159	11379
1992	2410	12192
1993	2604	13055
1995	2977	14537
1996	3151	15605
1997	3321	16531

Source: National Center for Educational Statistics

   a. Use a scatterplot to show the relationship between public and private costs with time.
   b. What is the Pearson Correlation between public and private four-year cost?

2. The revenue by percent for elementary and secondary public schools funding from federal, state, and local sources are shown below.

Year	Federal	State	Local
1920	0.3	16.5	83.2
1930	0.4	16.9	82.7
1940	1.8	30.3	68.0
1950	2.9	39.8	57.3
1960	4.4	39.1	56.5
1970	8.0	39.9	52.1
1980	9.8	46.8	43.4
1990	6.1	47.2	46.6

Source: National Center for Educational Statistics

   a. What is the correlation between the percent contribution from the federal government and the state?
   b. Is there a relationship between the federal revenue to schools and the local sources?

3. A company compared the commuting distance and number of absences for employees of a certain department and found the following results.

Distance (MI)	Absence (Days)
8	4
21	5
8	5
8	3
2	2
15	5
17	7
11	4

   a. What conclusion can you make form a scatterplot of the data?
   b. What is the correlation coefficient between commuting distance and days absent?
   c. Draw a best fit regression line.

4. The following are the heights (in inches) of eight female students and the corresponding heights of their boyfriends.

Female	Male
64	70
62	71
66	73
65	68
64	72
70	71
61	62
66	69

   a. Make a scatterplot of the data
   b. Is there a correlation between heights of female students and their boyfriend's heights?
   c. Is there any outlier in the data?
   d. Redo parts a and b with outlier removed.

Exercises 5.1 cont.

5. The number of years of education beyond high school and incomes for the following randomly selected graduates after high school graduates is shown below.

Years of Education	Income ($1000)
2	27
5	33
0	22
2	25
7	48
4	35
0	28
6	32
4	22
5	30

   a. Make a scatterplot of the data.
   b. What is the correlation between years of education beyond high school and income?

6. One week during the winter a small mall counted the number of customers inside and the midday temperature (^{0}C) outside. The data is shown below.

Temperature	# Customers
2	93
17	60
21	30
16	63
5	82
12	76
24	43
4	89
22	49
24	36

   a. What is the correlation between outside temperature and customers inside?
   b. From a scatterplot what conclusion can you make about the relationship of the temperature outside and the number of customers inside?

7. Is there a correlation between average time doing homework and student's grade on math exam from the data collected by a math teacher below?

Time Doing Homework	Exam Grades
15	58
25	72
50	85
20	75
25	68
30	88
40	80
15	74
25	78
30	70
45	94
35	75

8. What conclusion can you make using a scatterplot and correlation analysis, about the average age and median income ($) in the USA in 2005?

Average Age	Median Income
20	28,770
30	47,379
40	58,084
50	62,424
60	52,260

Source: 2005 Information Please almanac

9. It there a correlation between corporate profits and investments in plant improvements from the data below?

Year	Profits (Billions)	Improvements (Billions)
1970	69	106
1975	121	163
1980	192	318
1985	223	456
1990	293	592
1993	442	650

Source: 1995 Information Please almanac

Describe the correlation between X and Y:
$X = \{45,36,48,62,60,72,76,84,67,60,53,68\}$ and corresponding
$Y = \{6,6,10,14,15,18,14,15,12,10,9,11\}$

***Section 5.2*:** Exercises on Spearman Correlation

Exercises 5.2

1. Compute the Spearman correlation coefficient for the following ordinal measurements:

X	***Y***
4	10
6	16
1	7
13	12
8	10

2. Draw a scatterplot and compute *SP*, Pearson *r* and Spearman *r* for the following interval data.

Name	Act 1	Act 2
Bob	13	15
Mike	5	4
Joe	12	13
Bill	11	11
Sam	9	10
John	14	14
Jack	8	9
Ken	7	8

3. Below is a hypothesized set of interval scores that measures the number of correct responses about the preferences of their mates for eight married couples. Use Spearman's formula (computational) to find the correlation between couples's responses. Draw a scatterplot to help you make a judgment about the correlation result.

Couples	Husbands	Wives
A	11	14
B	6	7
C	16	15
D	4	7
E	1	3
F	10	9
G	5	9
H	4	8

4. A company compared the commuting distance and number of absences for employees of a certain department and found the following results.

Distance (MI)	Absence (Days)
8	4
21	5
8	5
8	3
2	2
15	5
17	7
11	4

   a. Rank the data and compute the Spearman correlation (average tied ranks)
   b. Draw a scatterplot of the ranked data.

5. The following are the heights (in inches) of eight female students and the corresponding heights of their boyfriends. Compute the Spearman *r*.

Female	Male
64	70
62	71
66	73
65	68
64	72
70	71
66	69

6. Is there a correlation between an independent ranking and an instructors grading scheme? First rank the grades.

Rank	Grade
1	A
3	A
5	B
7	D
9	D

Rank	Grade
2	B
4	B
6	C
8	C
10	F

***Section 6.2*:** Exercises on One-Sample Mean for Known Sigma

Exercises 6.2

1. How is the standard error and the standard deviation of a sample related?

2. What are the mean and standard deviation of the sampling distribution?

3. Given the population $\mu = 25$ and $s = 4$, find
   a. s_M, when $n = 64$
   b. s_M, when $n = 9$
   c. How does n affects s_M?

4. State the Central Limit Theorem.

5. For a population with $\mu = 40$ and $s = 2$, compute the z-scores for
   a. A sample of $n = 25$ and $M = 35$
   b. A sample of $n = 25$ and $M = 45$
   c. A sample of $n = 16$ and $M = 35$
   d. A sample of $n = 16$ and $M = 45$

6. Can we conclude that a population with $s = 2$ has a mean, $\mu = 8$ given the following sample?
   X ={4, 6, 7, 4, 9, 10, 3, 4, 5, 8, 7}
   Test at an alpha level, $a = 0.05$

7. Given the following information about height of men over 18 years old, $\mu = 69$ inches, $s = 10$, $N = 900$, find the following:
   a. CI_{95}
   b. CI_{90}

8. For a population with $\mu = 65\%$, $s = 8$, can we conclude that the sample mean, $M = 70\%$ is greater than what is in the population at a significance level of 0.05 if the sample size was $n = 60$?

9. For a population with $\mu = 110$, $s = 15$, can we conclude that the sample mean, $M = 105$ is less than what is in the population at a significance level of 0.05 if the sample size was $n = 49$?

10. For a population with $\mu = 5.8$, $s = 2.4$, can we conclude that the sample mean, $M = 6.4$ is equal to the population mean at a significance level of 0.05 if the sample size was $n = 36$?

11. For a population with $\mu = 5.8$, $s = 1.2$, can we conclude that the sample mean, $M = 6.0$ is equal to the population mean at a significance level of 0.01 if the sample size was $n = 36$?

12. The SAT math scores in 2003 had the following parameters $\mu = 508$ and $s = 100$
   a. What percent of students is expected to score less than 500 on the SAT math test?
   b. What percent of students is expected to score more than 700 on the SAT math test?
   c. What percent of students is expected to score between 400 and 700 on the SAT math test?

13. If the population parameters of an IQ test are $\mu = 100$ and $s = 15$,
   a. What percent of subjects is expected to have an IQ score above 140?
   b. What percent of subjects is expected to have IQ scores between 60 and 80?

14. The statewide parameters for English and Math are: English $\mu = 75$, s = 18 and Math $\mu = 73$ and $s = 15$. If Troy scored 82 on his English exam and 80 on his Math exam, which exam did he did best on?

15. If the population of girls in a dorm weights on average 126 pounds last year, what can you say about the population of girls in the same dorm if the sample below was taken this year?
   105, 110, 112, 140, 98, 102, 130, 155, 127, 118, 107, 116, 106, 132, 120, 134

16. Find the score that 60% of a parameter is less than or equal to if $\mu = 24$ and $s = 2.5$.

***Section 6.3*:** Exercises on One-Sample Mean Unknown Sigma

Exercises 6.3

1. What factors determine whether the *z*-score or *t* statistics is used when performing the one-sample hypothesis testing?

2. What happens to the *t* distribution as the sample size increases?

3. What is the relationship between the degree of freedom and the shape of the *t* distribution?

4. Which statistics best estimate s_M?

5. If you have a sample of $n = 200$, which probability distribution would you use to determine the critical value for you analysis? Explain.

6. What is the degree of freedom for the one-sample *t* test for the difference of means?

7. If the null hypothesis is $\mu = 12$, what are the possible ways to state the alternative hypothesis?

8. Given the following information: $\mu = 34$, $s = 5$, $n = 12$, and $M = 32$; compute the following:
   a. The standard error
   b. The *t*- statistics
   c. The CI_{95} for sample mean
   d. The effect size

9. Given the following information about a population from a sample: : $\mu = 12.5$, $s = 2.5$, $n = 8$, and $M = 13$; do the following:
   a. State H_0
   b. State a non-directional H_a
   c. Compute the test statistics
   d. Make a decision about your hypothesis using the critical value for the test at $a = 0.05$

10. Test the hypothesis that the population mean has not changed from a value of 49 if a sample of $n = 28$, $M = 53$, $s = 4$ was obtained to evaluate the hypothesis. Use $a = 0.05$.

11. Given the following information about a population from a sample: : $\mu = 100$, $s = 16$, $n = 12$, and $M = 90$; do the following at $a = 0.01$:
   a. State the null hypothesis
   b. State a directional H_a
   c. State the critical region
   d. Make a decision about H_0

12. A group of 25 graduate candidates who took the GRE are being compared on their Verbal scores to see if they have the potential to complete the graduate program of study. Former candidates who completed the program had an average GRE Verbal score of 620. If the 25 candidates' GRE statistics are $M = 605$ and s = 100, at the 95% confidence level, can you assume that these candidates are different, with respect to the GRE Verbal scores, from successful former candidates?

13. The average height of men attending ABC College is 69 inches. If the 15 members of ABC's basketball team have an average height of 73 inches with a standard deviation of $s = 8$, find the following:
   a. What is the CI_{99} for the height of the members of the basketball team?
   b. From the CI_{99} can you conclude that team's height is greater than male students at ABC College?
   c. What is the *p*-value of your test statistics and what can you say about the significance of your test?

14. What is the 99% confidence interval of the difference between $M - \mu$; what does this interval containing zero or not tell you about H_0?

Exercises 6.3 *cont*.

15. Compute, using appropriate formulas, the following statistics given the sample of weight, *W* (lb) of girls below:

a. s_M,
b. *t*-statistics,
c. CI_{95}
d. Give an example of a H_0 that would be rejected based on your results of part c.

W ={95, 86, 68, 96. 88, 79, 82, 100}

16. Does analysis of the sample below shows that the population mean, μ = 118 has changed? Test your hypothesis at the 0.05 significance level.
112, 118, 120, 119, 115, 132, 120, 105, 114, 122, 116, 115, 121, 108, 114, 119

17. Which team's average score below is different from the score of Champions of μ = 100?

Team A	Team B	Team C
98	*103*	*100*
102	*100*	*96*
101	*95*	*85*
85	*102*	*100*
99	*98*	*90*
90	*86*	*85*
105	*100*	*86*
108	*96*	*95*
102	*94*	*100*

18. A random sample is obtained from a population with mean, μ = 45. After treatment is administered to the sample, the sample mean is found to be *M* = 65 and the sample variance is 25.

a. What is the size of the treatment effect, *d*, if *n=16*
b. What is the size of the treatment effect, *d*, if *n* =100.
c. What conclusion can you draw about your experiment given parts a and b?

19. A sample of n = 18, s = 0.84, and M = 47.5 is being compared to the population mean, μ = 45 ; do the following at a = 0.05:

a. State the null hypothesis
b. State a directional H_a
c. State the critical region
d. Make a decision about H_0

20. Is the population mean for the following sample data equals 50?

55	*60*	*48*
23	*34*	*55*
78	*80*	*28*
63	*60*	*60*
38	*50*	*54*
40	*86*	*39*
60	*38*	*40*
58	*56*	*63*
49	*85*	*45*

21. Paul's scores, *X* on two exams in a class of 25 students is shown below; the population mean score for Exam A is 75 and 85 for Exam B.

Exam A	X = 70, the class's s = 5
Exam B	X = 92, the class's s = 8

a. Is Paul's score on Exam A typical? Use a CI_{95} to compare with μ = 75
b. Is Paul's score on Exam B typical?

22. For a population of μ = 80, a sample of n = 12 yields the following statistics: M = 72, s = 14. Do the following:

a. Test H_0, at the alpha = 0.01 level, that $M - \mu = 0$.
b. Compute and interpret the result of the effect size.

23. What would you conclude if the results of your hypothesis test produced a *p*-value = 0.07 and *d* = 0.58?

24. If the *t* statistics is 2, s = 6.8 and n = 20, what is the mean, *M* of your sample?

***Section 7.1*:** Exercises on One-Sample Correlation Test ($\rho = 0$)

Exercises 7.1

1. The U.S. National Center for Educational Statistics average cost of tuition and fees at U.S. four-year colleges are shown in the table below. Is there a significant correlation between cost of public and private colleges at the alpha = 0.05 level?

Year	Public	Private
1989	1846	9451
1990	2035	10348
1991	2159	11379
1992	2410	12192
1993	2604	13055
1995	2977	14537
1996	3151	15605
1997	3321	16531

Source: National Center for Educational Statistics

2. The revenue by percent for elementary and secondary public schools funding from federal, state, and local sources are shown below. Test the significance at $a = 0.05$ that the correlation, $\rho = 0$: between (a) federal and state and (b) federal and local
   Test the significance of these correlations using the following approaches:
   a. The critical value of the correlation
   b. The critical value of the *t* distribution

Year	Federal	State	Local
1920	0.3	16.5	83.2
1930	0.4	16.9	82.7
1940	1.8	30.3	68.0
1950	2.9	39.8	57.3
1960	4.4	39.1	56.5
1970	8.0	39.9	52.1
1980	9.8	46.8	43.4
1990	6.1	47.2	46.6

Source: National Center for Educational Statistics

3. A company compared the commuting distance and number of absences for employees of a certain department and found the following results. Test is there is a significant relationship between commuting distance and absenteeism at $a = 0.05$. Test the significance of the correlation using any two of the following approaches:
   a. The *p* value of the test statistics
   b. The confidence interval about the Pearson *r*

Distance (MI)	Absence (Days)
8	4
21	5
8	5
8	3
2	2
15	5
17	7
11	4

4. The following are the heights (in inches) of eight female students and the corresponding heights of their boyfriends. Is there a significant correlation between heights and female students and the height of their boyfriends? Remove outlier and test at $a = 0.05$.

Female	Male
64	70
62	71
66	73
65	68
64	72
70	71
61	62
66	69

Exercises 7.1 cont.

5. The number of years of education beyond high school and incomes for the following randomly selected graduates after high school graduates is shown below. Test whether there is a significant correlation between number of years of education beyond high school and income at $a = 0.05$ and $a = 0.01$ levels.

Years of Education	Income ($1000)
2	27
5	33
0	22
2	25
7	48
4	35
0	28
6	32
4	22
5	30

6. One week during the winter a small mall counted the number of customers inside and the midday temperature (^{0}C) outside. The data is shown below. Is there a significant correlation between outside temperature and the number of customers inside? Test at $a = 0.05$ using the following approaches:
    a. The critical value for t distribution
    b. The confidence interval for r

Temperature	# Customers
2	93
17	60
21	30
16	63
5	82
12	76
24	43
4	89
22	49
24	36

7. Is there a significant correlation between average time doing homework and student's grade on math exam from the data collected by a math teacher below? Test at $a = 0.05$ using at least two approaches.

Time Doing Homework	Exam Grades
15	58
25	72
50	85
20	75
25	68
30	88
40	80
15	74
25	78
30	70
45	94
35	75

8. What conclusion can you make using an alpha = 0.05 significance about the correlation between average age and median income ($) in the USA in 2005?

Average Age	Median Income
20	28,770
30	47,379
40	58,084
50	62,424
60	52,260

Source: 2005 Information Please almanac

9. It there a significant correlation between corporate profits and investments in plant improvements from the data below? Test at $a = 0.05$.

Year	Profits (Billions)	Improvements (Billions)
1970	69	106
1975	121	163
1980	192	318
1985	223	456
1990	293	592
1993	442	650

Source: 1995 Information Please almanac

In Progress