[A] Circle whether each statement is true or false.

T F   1. An ANOVA is an F test of two variances.

T F   2. The peak of a χ^2 distribution is at $\chi^2 = n - 2$.

T F   3. Extrapolation often yields unrealistic results.

T F   4. The lowest possible value of χ^2 and of F is zero.

T F   5. In a χ^2 test of independence, both variables are discrete.

T F   6. For the data sets {4, 5, 6}, {5, 6, 7}, and {5, 7, 9}, $MS_W = (2 + 2 + 8) \div 6$.

T F   7. In a negative correlation, lower values of x predict lower values of y.

T F   8. If a group of 80 people includes 44 males and 60 skiers, E for male skiers is 33.

T F   9. ANOVA tests if there is significantly more variance between samples than within samples.

T F   10. When calculating χ^2 for a test of a single variance from data, s and σ can be found on the calculator.

T F   11. "The data do not come from a normal distribution" could be the null hypothesis in a χ^2 goodness of fit test.

T F   12. A reasonable estimate for the correlation coefficient between time spent studying and time spent using social media is 0.50.

T F   13. If the correlation between total amout of alcohol consumed by age 30 and brain size at age 30 is $r = -.71$, $p < .05$, it can be concluded that alcohol reduces brain size.

[B] Sheena measures the resting heart rate of nine senior girls and times them in a mile run.

participant #	1	2	3	4	5	6	7	8	9
resting heart rate (bpm):	55	65	70	81	48	63	63	69	79
mile time (seconds):	309	451	502	595	311	640	355	410	536

1. Explain why she will do a right-tailed test, and state how to indicate this on the calculator.

2. Calculate r and state Sheena's conclusion, followed by r and p.

3. What is the equation of the line of best fit for Sheena's data?

4. What mile time would be predicted by the line of best fit for a girl with a resting heart rate of 60 beats per minute? Express your answer as minutes and seconds rather than seconds (e.g., 7:30 rather than 450).

[C] For each research question, state the type of test, the critical value, and the conclusion that would be reached if the p value were below .05. Label the critical value with the appropriate symbol (e.g., F_0).

1. Do people write faster using cursive than printing? ($n = 46$)

type of test: critical value:

conclusion:

2. Does reaction time vary by profession? ($n_1 = 12$, $n_2 = 11$, $n_3 = 11$)

type of test: critical value:

conclusion:

3. Is there a relationship between alcohol consumption and intelligence? ($n = 16$)

type of test: critical value:

conclusion:

4. Is there a relationship between favorite sport (football, baseball, or basketball) and favorite holiday (Halloween, Thanksgiving, or Christmas)? ($n = 40$)

type of test: critical value:

conclusion:

5. Is one gender more likely than the other to vote for Verduzco for president? ($n_1 = 44$, $n_2 = 50$)

type of test: critical value:

conclusion:

[D] Officer O'Brien is studying the relationship car color has with speed and with model. For each scenario, state the conclusion followed by the calculated statistic and the p value.

1. The speeds in the first sample of cars (in mph) are: black—55, 59, 50, 56, 58, and 53; white— 38, 44, 53, 50, 56, 48, and 64; colored—62, 68, 50, 64, 70, 50, and 59. Do an ANOVA.

2. In the second sample, 19 of the black cars are sedans, 25 are coupes, and 12 are other; 25 of the white cars are sedans, 5 are coupes, and 4 are other, and 19 of the colored cars are sedans, 15 are coupes, and 18 are other. Do a test of independence.

[E] Do the following to organize your group's reviews.

1. Make sure your name and your partners' names are at the top of your review the first day.

2. Staple the reviews in order, all facing the same way. Put the staple in the very top left corner if everyone is finished or if the review is due; otherwise put the staple in the top right corner.

[A] Circle whether each statement is true or false.

T F   1. An ANOVA is an F test of two variances.

T F   2. The peak of a χ^2 distribution is at $\chi^2 = n - 2$.

T F   3. Extrapolation often yields unrealistic results.

T F   4. The lowest possible value of χ^2 and of F is zero.

T F   5. In a χ^2 test of independence, both variables are discrete.

T F   6. For the data sets {4, 5, 6}, {5, 6, 7}, and {5, 7, 9}, $MS_W = (2 + 2 + 8) \div 6$.

T F   7. In a negative correlation, lower values of x predict lower values of y.

T F   8. If a group of 80 people includes 44 males and 60 skiers, E for male skiers is 33.

T F   9. ANOVA tests if there is significantly more variance between samples than within samples.

T F   10. When calculating χ^2 for a test of a single variance from data, s and σ can be found on the calculator.

T F   11. "The data do not come from a normal distribution" could be the null hypothesis in a χ^2 goodness of fit test.

T F   12. A reasonable estimate for the correlation coefficient between time spent studying and time spent using social media is 0.50.

T F   13. If the correlation between total amout of alcohol consumed by age 30 and brain size at age 30 is $r = -.71$, $p < .05$, it can be concluded that alcohol reduces brain size.

[B] Sheena measures the resting heart rate of nine senior girls and times them in a mile run.

participant #	1	2	3	4	5	6	7	8	9
resting heart rate (bpm):	58	74	61	73	80	69	64	75	80
mile time (min:sec)	6:00	8:30	5:45	8:06	8:15	7:24	6:48	8:36	9:03

1. Explain why she will do a right-tailed test, and state how to indicate this on the calculator.

2. Calculate r and state Sheena's conclusion, followed by r and p.

3. What is the equation of the line of best fit for Sheena's data?

4. What mile time would be predicted by the line of best fit for a girl with a resting heart rate of 60 beats per minute? Express your answer as minutes and seconds rather than seconds (e.g., 7:30 rather than 450).

[C] For each research question, state the type of test, the critical value, and the conclusion that would be reached if the *p* value were below .05. Label the critical value with the appropriate symbol (e.g., F_0).

1. Do people write faster using cursive than printing? ($n = 29$)

type of test: critical value:

conclusion:

2. Does reaction time vary by profession? ($n_1 = 12$, $n_2 = 16$, $n_3 = 15$)

type of test: critical value:

conclusion:

3. Is there a relationship between alcohol consumption and intelligence? ($n = 16$)

type of test: critical value:

conclusion:

4. Is there a relationship between favorite sport (football, baseball, basketball, or hockey) and favorite holiday (Halloween, Thanksgiving, or Christmas)? ($n = 51$)

type of test: critical value:

conclusion:

5. Using 6 categories, are speeds on Highway 17 not normally distributed? ($n = 88$)

type of test: critical value:

conclusion:

[D] Officer O'Brien is studying the relationship car color has with speed and with model. For each scenario, state the conclusion followed by the calculated statistic and the *p* value.

1.The speeds of the first sample of cars (in mph) are: black—60, 55, 54, 51, 55, 52, and 54; white—54, 48, 55, 49, 52, 56, and 59; colored—54, 60, 60, 56, 57, 58, 60, and 58. Do an ANOVA.

2. In the second sample, 14 of the black cars are sedans, 16 are coupes, and 9 are other; 31 of the white cars are sedans, 16 are coupes, and 14 are other, and 19 of the colored cars are sedans, 12 are coupes, and 11 are other. Do a test of independence.

[E] Bonus.

1. Redo problem [D] #1, adding a yellow car going 130 mph.

a) State the new conclusion, the new *F*, and the new *p* value.   b) Explain why adding the really fast car caused this change in result.

[A] Circle whether each statement is true or false.

T F   1. An ANOVA is an F test of two variances.

T F   2. The peak of a χ^2 distribution is at $\chi^2 = n - 2$.

T F   3. Extrapolation often yields unrealistic results.

T F   4. The lowest possible value of χ^2 and of F is zero.

T F   5. In a χ^2 test of independence, both variables are discrete.

T F   6. For the data sets {4, 5, 6}, {5, 6, 7}, and {5, 7, 9}, $MS_W = (2 + 2 + 8) \div 6$.

T F   7. In a negative correlation, lower values of x predict lower values of y.

T F   8. If a group of 80 people includes 44 males and 60 skiers, E for male skiers is 33.

T F   9. ANOVA tests if there is significantly more variance between samples than within samples.

T F   10. When calculating χ^2 for a test of a single variance from data, s and σ can be found on the calculator.

T F   11. "The data do not come from a normal distribution" could be the null hypothesis in a χ^2 goodness of fit test.

T F   12. A reasonable estimate for the correlation coefficient between time spent studying and time spent using social media is 0.50.

T F   13. If the correlation between total amout of alcohol consumed by age 30 and brain size at age 30 is $r = -.71$, $p < .05$, it can be concluded that alcohol reduces brain size.

[B] Sheena measures the resting heart rate of nine senior girls and times them in a mile run.

participant #	1	2	3	4	5	6	7	8	9
resting heart rate (bpm):	64	79	68	84	58	67	67	81	78
mile time (min:sec):	7:30	6:24	8:15	9:50	5:24	5:49	6:30	7:21	9:58

1. Explain why she will do a right-tailed test, and state how to indicate this on the calculator.

2. Calculate r and state Sheena's conclusion, followed by r and p.

3. What is the equation of the line of best fit for Sheena's data?

4. What mile time would be predicted by the line of best fit for a girl with a resting heart rate of 60 beats per minute? Express your answer as minutes and seconds rather than seconds (e.g., 7:30 rather than 450).

[C] For each research question, state the type of test, the critical value, and the conclusion that would be reached if the *p* value were below .05. Label the critical value with the appropriate symbol (e.g., F_0).

1. Do people write faster using cursive than printing? ($n = 50$)

type of test: critical value:

conclusion:

2. Does reaction time vary by profession? ($n_1 = 14$, $n_2 = 10$, $n_3 = 10$, $n_4 = 10$)

type of test: critical value:

conclusion:

3. Is there a relationship between alcohol consumption and intelligence? ($n = 20$)

type of test: critical value:

conclusion:

4. Is there a relationship between favorite sport (football, baseball, basketball, soccer, or hockey) and favorite holiday (Halloween, Thanksgiving, or Christmas)? ($n = 75$)

type of test: critical value:

conclusion:

5. Does Professor Smith grade more consistently than Professor Bolt? ($n_1 = 16$, $n_2 = 13$)

type of test: critical value:

conclusion:

[D] Officer O'Brien is studying the relationship car color has with speed and with model. For each scenario, state the conclusion followed by the calculated statistic and the *p* value.

1. The speeds of the first sample of cars (in mph) are: black—53, 50, 48, 55, 56, 53, and 55; white—50, 50, 53, 47, 49, 52, 52, and 59; and colored—54, 59, 57, 62, 50, 54, 54, 56, and 59. Do an ANOVA.

2. In the second sample, 14 of the black cars are sedans, 7 are coupes, and 8 are other; 13 of the white cars are sedans, 7 are coupes, and 6 are other, and 15 of the colored cars are sedans, 9 are coupes, and 14 are other. Do a test of independence.

[E] Bonus.

1. Redo problem [D] #1, adding an orange car going 120 mph.

a) State the new conclusion, the new *F*, and the new *p* value.   b) Explain why adding the really fast car caused this change in result.

[A] Circle whether each statement is true or false.

T   F   1. An ANOVA is an F test of two variances.

T   F   2. The peak of a χ^2 distribution is at $\chi^2 = n - 2$.

T   F   3. Extrapolation often yields unrealistic results.

T   F   4. The lowest possible value of χ^2 and of F is zero.

T   F   5. In a χ^2 test of independence, both variables are discrete.

T   F   6. For the data sets {4, 5, 6}, {5, 6, 7}, and {5, 7, 9}, $MS_W = (2 + 2 + 8) \div 6$.

T   F   7. In a negative correlation, lower values of x predict lower values of y.

T   F   8. If a group of 80 people includes 44 males and 60 skiers, E for male skiers is 33.

T   F   9. ANOVA tests if there is significantly more variance between samples than within samples.

T   F   10. When calculating χ^2 for a test of a single variance from data, s and σ can be found on the calculator.

T   F   11. "The data do not come from a normal distribution" could be the null hypothesis in a χ^2 goodness of fit test.

T   F   12. A reasonable estimate for the correlation coefficient between time spent studying and time spent using social media is 0.50.

T   F   13. If the correlation between total amout of alcohol consumed by age 30 and brain size at age 30 is $r = -.71$, $p < .05$, it can be concluded that alcohol reduces brain size.

[B] Sheena measures the resting heart rate of nine senior girls and measures their speed in a mile run

participant #	1	2	3	4	5	6	7	8	9
resting heart rate (bpm):	67	65	70	81	48	59	63	69	80
average speed (mph):	10.9	7.9	7.1	5.1	11.4	9.6	9.8	5.9	6.2

1. Explain why she will do a left-tailed test, and state how to indicate this on the calculator.

2. Calculate r and state Sheena's conclusion, followed by r and p.

3. What is the equation of the line of best fit for Sheena's data?

4. What mile time would be predicted by the line of best fit for a girl with a resting heart rate of 60 beats per minute? Express your answer in minutes and seconds per mile, not miles per hour (e.g., 7:30 rather than 8.0 mph).

[C] For each research question, state the type of test, the critical value, and the conclusion that would be reached if the _p_ value were below .05. Label the critical value with the appropriate symbol (e.g., F_0).

1. Do people write faster using cursive than printing? ($n = 225$)

type of test: critical value:

conclusion:

2. Does reaction time vary by profession? ($n_1 = 12$, $n_2 = 16$, $n_3 = 17$, $n_4 = 11$)

type of test: critical value:

conclusion:

3. Is there a relationship between alcohol consumption and intelligence? ($n = 9$)

type of test: critical value:

conclusion:

4. Is there a relationship between favorite sport (football, baseball, basketball, soccer, or hockey) and favorite holiday (Halloween, Thanksgiving, Christmas, or New Year's)? ($n = 250$)

type of test: critical value:

conclusion:

5. Are the majority of Americans unable to convert miles per hour to minutes per mile? ($n = 49$)

type of test: critical value:

conclusion:

[D] Officer O'Brien is studying the relationship car color has with speed and with model. For each scenario, state the conclusion followed by the calculated statistic and the p value.

1. The speeds of the first sample of cars (in mph) are: black—45, 50, 53, 54, 56, 51, and 55; white—45, 49, 56, 52, 48, 49, and 53; colored—55, 59, 53, 52, 60, 59, 56, and 56. Do an ANOVA.

2. In the second sample, 20 of the black cars are sedans, 11 are coupes, and 12 are other; 25 of the white cars are sedans, 7 are coupes, and 4 are other, and 19 of the colored cars are sedans, 15 are coupes, and 14 are other. Do a test of independence.

[E] Bonus.

1. Redo problem [D] #1, adding a red car going 100 mph.

a) State the new conclusion, the new _F_, and the new _p_ value.   b) Explain why adding the really fast car caused this change in result.