

1. A new type of screening for lung cancer, computed tomography (CT), has been developed. Medical researchers believe that CT scans are more sensitive than regular X-rays in pinpointing small tumors. A university is conducting a clinical trial of 50,000 smokers nationwide to compare the effectiveness of CT scans with X-rays for detecting lung cancer. Each participating smoker will be randomly assigned to one of the two screening methods – CT or chest X-ray – and the age (in years) at which the scanning method first detects a tumor will be determined. One goal of the study is to compare the mean ages when cancer is first detected by the two screening methods.

Identify the response variable of the study.

- A. Screening method
- B. Cancer
- C. Smokers
- D. Age

Identify the experimental units of the study.

- A. Age
- B. Cancer
- C. Smokers
- D. Screening method

Identify the factor(s) in the study.

- A. Cancer
- B. Age
- C. Screening method
- D. Smokers

Identify the treatments in the study.

- A. Smokers
- B. CT scan or X-ray
- C. Cancer
- D. Age

2. A study of Machiavellian traits in lawyers was performed. Machiavellian describes negative character traits such as manipulation, cunning, duplicity, deception, and bad faith. A Mach rating score was determined for each in a sample of lawyers. The lawyers were then classified as having dishonest, neutral, or honest Mach rating scores. The researcher investigated the impact of both Mach score classification and marital status on the average income of a lawyer. For this experiment, identify **a.** the experimental unit, **b.** the response variable, **c.** the factors, **d.** the levels of each factor, and **e.** the treatments.

**a.** What are the experimental units?

- |   |                                      |
|---|--------------------------------------|
| <input type="radio"/> Mach score classification | <input type="radio"/> lawyers        |
| <input type="radio"/> employers                 | <input type="radio"/> employees      |
| <input type="radio"/> Mach rating scores        | <input type="radio"/> marital status |
| <input type="radio"/> income                    | <input type="radio"/> dollars        |

**b.** What is the response variable?

- Mach score classification
- negative character traits
- income
- Mach rating scores
- marital status

**c.** What are the factors? Select all that apply.

- A. marital status
- B. Mach score classification
- C. Mach rating scores
- D. negative character traits


**d.** What are the levels of each factor? Select all that apply.

2. (cont.)
- A. The levels for Mach score classification are dishonest, neutral, and honest.
  - B. The levels for marital status are single and married.
  - C. The levels for Mach score classification are manipulation, cunning, duplicity, deception, and bad faith.
  - D. The levels for negative character traits are manipulation, cunning, duplicity, deception, and bad faith.
  - E. The levels for Mach rating scores are 1, 2, and 3.

e. What are the treatments?

- A. (1, single), (1, married), (2, single), (2, married), (3, single), (3, married)
- B. (dishonest), (neutral), (honest)
- C. (manipulation, single), (manipulation, married), (cunning, single), (cunning, married), (duplicity, single), (duplicity, married), (deception, single), (deception, married), (bad faith, single), (bad faith, married)
- D. (dishonest, single), (dishonest, married), (neutral, single), (neutral, married), (honest, single), (honest, married)
- E. (dishonest, single), (dishonest, married), (neutral, single), (married, honest), (honest, single), (honest, married)

3. Consider the accompanying dot plots A and B. Assume that the two samples represent independent random samples corresponding to two treatments in a completely randomized design. Complete an ANOVA table for each of the two dot plots.

 Click the icon to view the dot plots.

Complete the following ANOVA table for dot plot A.

Source	df	SS	MS	F
Treatment	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
Error	<input type="text"/>	<input type="text"/>	<input type="text"/>	
Total	<input type="text"/>	<input type="text"/>		

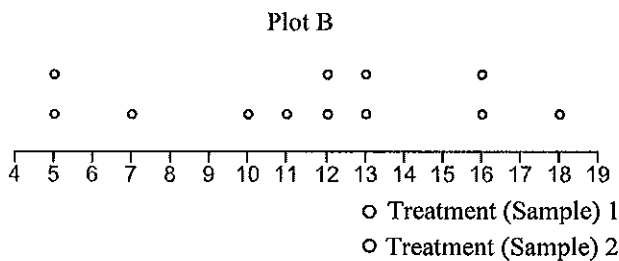
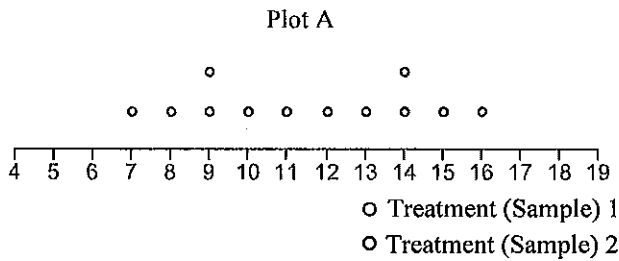
(Round to the nearest hundredth as needed.)

Complete the following ANOVA table for dot plot B.

Source	df	SS	MS	F
Treatment	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
Error	<input type="text"/>	<input type="text"/>	<input type="text"/>	
Total	<input type="text"/>	<input type="text"/>		

(Round to the nearest hundredth as needed.)

Graph/Chart



4. The data in the table to the right resulted from an experiment that utilized a completely randomized design.  Use this information to complete parts a and b.	Treatment 1	Treatment 2	Treatment 3	<input type="checkbox"/>
	3.4	5.4	1.9	
	1.3	2.6	0.2	
	4.9	4.8	2.1	
	5.1	3.2		
	2.2			

a. Use statistical software or the appropriate calculation formulas to complete the following ANOVA table.

Source	df	SS	MS	F statistic
Treatments	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Error	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Total	<input type="checkbox"/>	<input type="checkbox"/>		

(Type an integer or a decimal rounded to three decimal places as needed.)

b. Test the null hypothesis that  $\mu_1 = \mu_2 = \mu_3$ , where  $\mu_i$  represents the true mean for treatment  $i$ , against the alternative that at least two of the means differ. Use  $\alpha = 0.01$ . Choose the correct conclusion below.

- A. Do not reject  $H_0$ . There is insufficient evidence to indicate differences among the means.
  B. Reject  $H_0$ . There is sufficient evidence to indicate differences among the means.
- C. Reject  $H_0$ . There is insufficient evidence to indicate differences among the means.
  D. Do not reject  $H_0$ . There is sufficient evidence to indicate differences among the means.

5.

The partially completed ANOVA for a  $3 \times 4$  factorial experiment with two replications is shown to the right. Complete parts a through f.

Source	df	SS	MS	F
A	-	0.3	-	-
B	-	4.4	-	-
AB	-	9.7	-	-
Error	-	-	-	-
Total	-	16.9	-	-

a. Complete the ANOVA table.

Source	df	SS	MS	F
A	<input type="text"/>	0.3	<input type="text"/>	<input type="text"/>
B	<input type="text"/>	4.4	<input type="text"/>	<input type="text"/>
AB	<input type="text"/>	9.7	<input type="text"/>	<input type="text"/>
Error	<input type="text"/>	<input type="text"/>	<input type="text"/>	
Total	<input type="text"/>	16.9		

(Round the MS column to four decimal places as needed. Round the F column to two decimal places as needed.)

b. What is the sum of squares for treatments (SST)?

$$SST = \boxed{\phantom{000}}$$

Do the data provide sufficient evidence to indicate that the treatment means differ? Use  $\alpha = 0.05$ .

- Yes  
 No

c. Does the result of the test in part b warrant further testing?

- Yes  
 No

d. What is meant by factor interaction?

Two factors are said to interact if the effect of one factor on the dependent variable  is  the same  is not  at different levels of the second factor.

5.  
(cont.) What is the practical implication if it exists?

- A. If the factors interact, then all tests are invalid.
- B. If the factors interact, then stop statistical calculation at this point.
- C. If the factors interact, then tests for main effects are not necessary.
- D. If the factors interact, then tests for main effects are necessary.

e. Test to determine whether these factors interact to affect the response mean. Use  $\alpha = 0.05$ .

F =  (Round to two decimal places as needed.)


Determine the correct interpretation of the result.

There is   
 evidence to indicate the two factors interact to affect the response mean at  $\alpha = 0.05$ .

f. Does the result of the interaction test warrant further testing?

- No
- Yes

6. A study of four different types of egg housing systems was performed. The four egg housing systems were cage, barn, free range, and organic. In addition to housing system, the researchers also determined the weight class (medium or large) for each sampled egg. The data on whipping capacity (percent overrun) for the 28 sampled eggs are shown in the accompanying table. The researchers want to investigate the effect of both housing system and weight class on the mean whipping capacity of the eggs. In particular, they want to know whether the difference between the mean whipping capacity of medium and large eggs depends on the housing system. Complete parts a through e below.

 Click on the icon to view the data table.

- a. Identify the factors and treatments for this experiment.

Identify the factors for this experiment. Select all that apply.

- Housing  
 Weight class  
 Whipping capacity

Identify the treatments for this experiment. Let "M" stand for "medium" and "L" stand for "large". Select all that apply.

- A. L / High %       B. Organic / L       C. M / High %       D. Cage / L  
 E. Barn / M       F. Barn / Low %       G. Free / High %       H. L / Low %  
 I. Cage / M       J. Free / M       K. Cage / Low %       L. M / Low %  
 M. Barn / High %       N. Barn / L       O. Organic / M       P. Free / L

- b. Use statistical software to conduct an ANOVA on the data. Report the results in an ANOVA table.

Complete the ANOVA table below.

Source	DF	SS	MS	F	P
Housing	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Weight class	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Interaction	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Error	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
Total	<input type="checkbox"/>	<input type="checkbox"/>			

(Round to three decimal places as needed.)

6. (cont.) c. Is there evidence of interaction between housing system and weight class? Test using  $\alpha = 0.05$ . [Hint: Due to an unbalanced design, you will need to analyze the data using the general linear model procedure of your statistical software.] What does this imply, practically?

What are the null and alternative hypotheses?

$H_0$ : Housing system and weight class 

do not
do

 interact to affect whipping capacity.

$H_a$ : Housing system and weight class 

do not
do

 interact to affect whipping capacity.

Find the test statistic to test for interaction between housing system and weight class.

$F = \square$  (Round to three decimal places as needed.)

Find the critical value for the test for interaction.

$F_\alpha = \square$  (Round to two decimal places as needed.)

What is the conclusion to the hypothesis test?

- Do not reject the null hypothesis.
- Reject the null hypothesis.

What does this imply, practically?

- There is sufficient evidence to conclude that there is interaction between housing system and weight class.
- There is not sufficient evidence to conclude that there is interaction between housing system and weight class.

d. Interpret the main effect test for housing system (using  $\alpha = 0.05$ ). What does this imply, practically?

What are the null and alternative hypotheses?

6.  
(cont.)

There is a large difference among the four mean levels of housing.  
 $H_0$ : At least two housing mean levels differ.  
At least three housing mean levels differ.  
There is no difference among the four mean levels of housing.

At least three housing mean levels differ.  
 $H_a$ : There is a large difference among the four mean levels of housing.  
There is no difference among the four mean levels of housing.  
At least two housing mean levels differ.

Find the test statistic to test for the main effect of housing.

$F = \square$  (Round to three decimal places as needed.)

Find the critical value for the test for the main effect of housing.

$F_\alpha = \square$  (Round to two decimal places as needed.)

What is the conclusion to the hypothesis test?

- Reject the null hypothesis.
- Do not reject the null hypothesis.

What does this imply, practically?

- There is sufficient evidence to conclude that at least two housing mean levels differ.
- There is not sufficient evidence to conclude that at least two housing mean levels differ.

e. Interpret the main effect test for weight class (using  $\alpha = 0.05$ ). What does this imply, practically?

What are the null and alternative hypotheses?

6.  
 (cont.)

- There is no difference among the two mean levels of weight class.
- $H_0$ : There is a large difference among the two mean levels of weight class.  
 At least three weight class mean levels differ.  
 At least two weight class mean levels differ.
- 
- At least two weight class mean levels differ.
- $H_a$ : At least three weight class mean levels differ.  
 There is no difference among the two mean levels of weight class.  
 There is a large difference among the two mean levels of weight class.

Find the test statistic to test for the main effect of weight class.

$F = \square$  (Round to three decimal places as needed.)

Find the critical value for the test for the main effect of weight class.

$F_\alpha = \square$  (Round to two decimal places as needed.)

What is the conclusion to the hypothesis test?

- Reject the null hypothesis.
- Do not reject the null hypothesis.

What does this imply, practically?

- There is sufficient evidence to conclude that at least two weight class mean levels differ.
- There is not sufficient evidence to conclude that at least two weight class mean levels differ.

Data Table

Housing	Weight Class	Overrun (%)
Cage	M	511, 475, 476, 457, 458
	L	499, 483, 492, 493, 462
Free	M	508, 515, 518
	L	503, 531, 505
Ram	M	527, 498, 514

Time: 2:52 PM

	Dall	VI	521, 470, 514
		L	545, 518, 512
Organic		M	540, 528, 531
		L	544, 539, 526

7. What conditions must  $n$  satisfy to make the  $\chi^2$  test valid?
- Choose the correct answer below.
- A.  $n$  must be equal to 10 or more.
  - B.  $n$  must be equal to 5 or more.
  - C.  $n$  must be large enough so that for every cell the expected cell count will be equal to 10 or more.
  - D.  $n$  must be large enough so that for every cell the expected cell count will be equal to 5 or more.

8. The table to the right gives a breakdown of the root causes of a sample of 80 industrial accidents. Are there significant differences in the percentage of incidents in the four cause categories? Test using  $\alpha = 0.05$ .

System Cause	Number of Incidents
Design	20
Procedures	22
Management	23
Training	15
Total	80

Determine the null and alternative hypotheses for this test. Choose the correct answer below.

- A.  $H_0: p_1 = p_2 = p_3 = p_4 = 0.25$   
 $H_a: p_1 \neq p_2 \neq p_3 \neq p_4$
- B.  $H_0: p_1 \neq p_2 \neq p_3 \neq p_4$   
 $H_a: \text{At least one of the multinomial probabilities equals its hypothesized value.}$
- C.  $H_0: p_1 = p_2 = p_3 = p_4 = 0.25$   
 $H_a: \text{At least one of the multinomial probabilities does not equal its hypothesized value.}$

Now find the test statistic.

$\chi^2 = \square$  (Round to two decimal places as needed.)

Find the critical value.

$\chi^2_{\alpha} = \square$  (Round to four decimal places as needed.)

Find the p-value.

$\square$  (Round to four decimal places as needed.)

Choose the correct conclusion below.

- A. Fail to reject  $H_0$ . There is sufficient evidence that there are significant differences in the percentage of incidents in the four cause categories.
- B. Reject  $H_0$ . There is insufficient evidence that there are significant differences in the percentage of incidents in the four cause categories.
- C. Reject  $H_0$ . There is sufficient evidence that there are significant differences in the percentage of incidents in the four cause categories.
- D. Fail to reject  $H_0$ . There is insufficient evidence that there are significant differences in the percentage of incidents in the four cause categories.

9. Each day's proportion of one week's total truck traffic is shown in the table to the right. During the same week, the number of overweight trucks per day is given in the second column. Determine whether the number of overweight trucks per week is distributed over the seven days of the week in direct proportion to the volume of truck traffic. Test using  $\alpha = 0.01$ .

	Proportion	Number
Monday	0.191	90
Tuesday	0.191	89
Wednesday	0.181	77
Thursday	0.176	65
Friday	0.155	57
Saturday	0.042	18
Sunday	0.064	37

Determine the null and alternative hypotheses for this test. Choose the correct answer below.

- A.  $H_0: p_1 = 0.191, p_2 = 0.191, p_3 = 0.181, p_4 = 0.176, p_5 = 0.155, p_6 = 0.042, p_7 = 0.064$   
 $H_a$ : At least one of the multinomial probabilities does not equal its hypothesized value.
- B.  $H_0: p_1 \neq 0.191, p_2 \neq 0.191, p_3 \neq 0.181, p_4 \neq 0.176, p_5 \neq 0.155, p_6 \neq 0.042, p_7 \neq 0.064$   
 $H_a$ : At least one of the multinomial probabilities equals its hypothesized value.
- C.  $H_0: p_1 = p_2 = p_3 = p_4 = p_5 = p_6 = p_7$   
 $H_a: p_1 \neq p_2 \neq p_3 \neq p_4 \neq p_5 \neq p_6 \neq p_7$

Now find the test statistic.

$\chi^2 = \square$  (Round to two decimal places as needed.)

Find the p-value.

$\square$  (Round to four decimal places as needed.)

Choose the correct conclusion below.

Fail to reject  $H_0$ . There is  sufficient evidence that the number of overweight trucks per week is not distributed over the seven days of the week in direct proportion to the volume of truck traffic.
  Reject  $H_0$ . There is  insufficient evidence that the number of overweight trucks per week is not distributed over the seven days of the week in direct proportion to the volume of truck traffic.

10. Find the rejection region for a test of independence of two classifications where the contingency table contains  $r$  rows and  $c$  columns.
- $\alpha = 0.05$ ,  $r = 5$ ,  $c = 4$
  - $\alpha = 0.10$ ,  $r = 4$ ,  $c = 3$
  - $\alpha = 0.01$ ,  $r = 3$ ,  $c = 6$

[Click to view page 1 of the critical values of Chi-squared](#)

[Click to view page 2 of the critical values of Chi-squared](#)

- a. Select the correct choice below and fill in the answer box(es) to complete your choice.

(Round to four decimal places as needed.)

- A.  $\chi^2 < \blacksquare$
- B.  $\chi^2 < \blacksquare$  or  $\chi^2 > \blacksquare$
- C.  $\chi^2 > \blacksquare$

- b. Select the correct choice below and fill in the answer box(es) to complete your choice.

(Round to four decimal places as needed.)

- A.  $\chi^2 < \blacksquare$  or  $\chi^2 > \blacksquare$
- B.  $\chi^2 < \blacksquare$
- C.  $\chi^2 > \blacksquare$

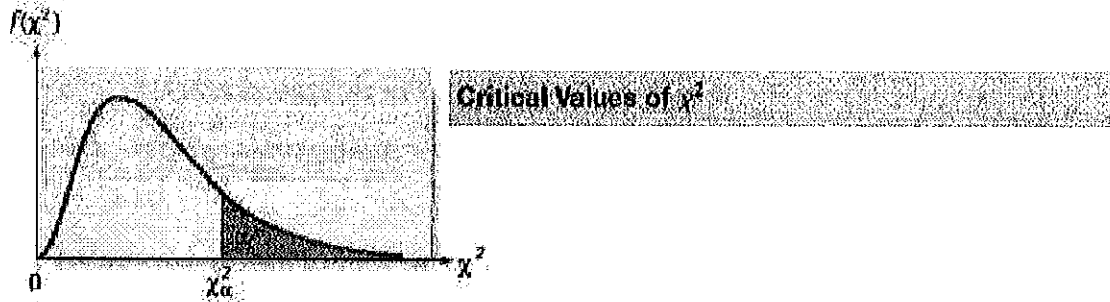
- c. Select the correct choice below and fill in the answer box(es) to complete your choice.

(Round to four decimal places as needed.)

- A.  $\chi^2 < \blacksquare$
- B.  $\chi^2 < \blacksquare$  or  $\chi^2 > \blacksquare$
- C.  $\chi^2 > \blacksquare$

chi-squared page 1

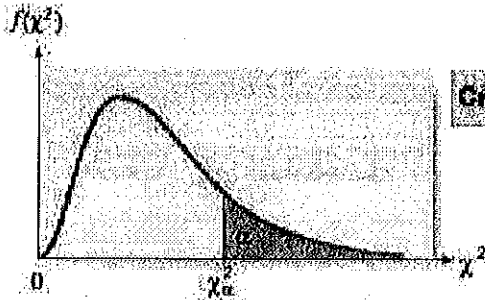
10.  
(cont.)



Degrees of Freedom	$\chi^2_{.995}$	$\chi^2_{.990}$	$\chi^2_{.975}$	$\chi^2_{.950}$	$\chi^2_{.900}$
1	.0000393	.0001571	.0009821	.0039321	.0157908
2	.0100251	.0201007	.0506356	.102587	.210720
3	.0717212	.114832	.215795	.351846	.584375
4	.206990	.297110	.484419	.710721	1.063623
5	.411740	.554300	.831211	1.145476	1.61031
6	.675727	.872085	1.237347	1.63539	2.20413
7	.989265	1.239043	1.68987	2.16735	2.83311
8	1.344419	1.645482	2.17973	2.73264	3.48954
9	1.734926	2.087912	2.70039	3.32511	4.16816
10	2.15585	2.55821	3.24697	3.94030	4.86518
11	2.60321	3.05347	3.81575	4.57481	5.57779
12	3.07382	3.57056	4.40379	5.22603	6.30380
13	3.56503	4.10691	5.00874	5.89186	7.04150
14	4.07468	4.66043	5.62872	6.57063	7.78953
15	4.60094	5.22935	6.26214	7.26094	8.54675
16	5.14224	5.81221	6.90766	7.96164	9.31223
17	5.69724	6.40776	7.56418	8.67176	10.0852
18	6.26481	7.01491	8.23075	9.39046	10.8649
19	6.84398	7.63273	8.90655	10.1170	11.6509
20	7.43386	8.26040	9.59083	10.8508	12.4426
21	8.03366	8.89720	10.28293	11.5913	13.2396
22	8.64272	9.54249	10.9823	12.3380	14.0415
23	9.26042	10.19567	11.6885	13.0905	14.8479
24	9.88623	10.8564	12.4011	13.8484	15.6587
25	10.5197	11.5240	13.1197	14.6114	16.4734
26	11.1603	12.1981	13.8439	15.3791	17.2919
27	11.8076	12.8786	14.5733	16.1513	18.1138
28	12.4613	13.5648	15.3079	16.9279	18.9392
29	13.1211	14.2565	16.0471	17.7083	19.7677
30	13.7867	14.9535	16.7908	18.4926	20.5992
40	20.7065	22.1643	24.4331	26.5093	29.0505
50	27.9907	29.7067	32.3574	34.7642	37.6886
60	35.5346	37.4848	40.4817	43.1870	46.4589
70	43.2752	45.4418	48.7576	51.7393	55.3290
80	51.1720	53.5400	57.1532	60.3915	64.2778
90	59.1963	61.7541	65.6466	69.1260	73.2912
100	67.3276	70.0648	74.2219	77.9295	82.3581


10. chi-squared page 2

(cont.)

Critical Values of  $\chi^2$  (continued)

Degrees of Freedom	$\chi^2_{.100}$	$\chi^2_{.950}$	$\chi^2_{.925}$	$\chi^2_{.900}$	$\chi^2_{.905}$
1	2.70554	3.84146	5.02389	6.63490	7.87944
2	4.60517	5.99147	7.37776	9.21034	10.5966
3	6.25139	7.81473	9.34840	11.3449	12.8381
4	7.77944	9.48773	11.1433	13.2767	14.8602
5	9.23635	11.0705	12.8325	15.0863	16.7496
6	10.6446	12.5916	14.4494	16.8119	18.5476
7	12.0170	14.0671	16.0128	18.4753	20.2777
8	13.3616	15.5073	17.5346	20.0902	21.9550
9	14.6837	16.9190	19.0228	21.6660	23.5893
10	15.9871	18.3070	20.4831	23.2093	25.1882
11	17.2750	19.6751	21.9200	24.7250	26.7569
12	18.5494	21.0261	23.3367	26.2170	28.2995
13	19.8119	22.3621	24.7356	27.6883	29.8194
14	21.0642	23.6848	26.1190	29.1413	31.3193
15	22.3072	24.9958	27.4884	30.5779	32.8013
16	23.5418	26.2962	28.8454	31.9999	34.2672
17	24.7690	27.5871	30.1910	33.4087	35.7185
18	25.9894	28.8693	31.5264	34.8053	37.1564
19	27.2036	30.1435	32.8523	36.1908	38.5822
20	28.4120	31.4104	34.1696	37.5662	39.9968
21	29.6151	32.6705	35.4789	38.9321	41.4010
22	30.8133	33.9244	36.7807	40.2894	42.7956
23	32.0069	35.1725	38.0757	41.6384	44.1813
24	33.1963	36.4151	39.3641	42.9798	45.5585
25	34.3816	37.6525	40.6465	44.3141	46.9278
26	35.5631	38.8852	41.9232	45.6417	48.2899
27	36.7412	40.1133	43.1944	46.9630	49.6449
28	37.9159	41.3372	44.4607	48.2782	50.9933
29	39.0875	42.5569	45.7222	49.5879	52.3356
30	40.2560	43.7729	46.9792	50.8922	53.6720
40	51.8050	55.7585	59.3417	63.6907	66.7659
50	63.1671	67.5048	71.4202	76.1539	79.4900
60	74.3970	79.0819	83.2976	88.3794	91.9517
70	85.5271	90.5312	95.0231	100.425	104.215
80	96.5782	101.879	106.629	112.329	116.321
90	107.565	113.145	118.136	124.116	128.299
100	118.498	124.342	129.561	135.807	140.169

11. Test the null hypothesis of independence of the two classifications A and B of the accompanying contingency table. Use  $\alpha = 0.05$ .

 Click the icon to view the table.

Specify the null and alternative hypotheses. Choose the correct answer below.

- A.  $H_0$ : The row and column classifications are dependent  
 $H_a$ : The row and column classifications are independent
- B.  $H_0$ : The row and column classifications are independent  
 $H_a$ : The row and column classifications are dependent
- C.  $H_0$ : The classifications  $A_1$  and  $B_1$  are independent  
 $H_a$ : The classifications  $A_1$  and  $B_1$  are dependent

Find the test statistic.

$\chi^2 = \square$  (Round to the nearest hundredth as needed.)

Specify the rejection region. Choose the correct answer below.

- A.  $\chi^2 > 15.5073$
- B.  $\chi^2 > 9.48773$
- C.  $\chi^2 > 16.9190$
- D.  $\chi^2 > 3.84146$

State the conclusion. Choose the correct answer below.

- A. Fail to reject  $H_0$ , there is insufficient evidence to indicate the row and column classification are dependent at  $\alpha = 0.05$ .
- B. Reject  $H_0$ , there is insufficient evidence to indicate the row and column classification are dependent at  $\alpha = 0.05$ .
- C. Reject  $H_0$ , there is sufficient evidence to indicate the row and column classification are dependent at  $\alpha = 0.05$ .
- D. Fail to reject  $H_0$ , there is sufficient evidence to indicate the row and column classification are dependent at  $\alpha = 0.05$ .

Data Table




B

<p>.....</p> <p>.....</p> <p>.....</p>
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11.			B <sub>1</sub>	B <sub>2</sub>	B <sub>3</sub>
(cont.)		A <sub>1</sub>	41	73	43
	A	A <sub>2</sub>	63	53	72
		A <sub>3</sub>	31	38	30

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12. A researcher examined the political strategies used by ethnic groups worldwide in their fight for minority rights. Each in a sample of 275 ethnic groups was classified according to world region and highest level of political action reported. The data are summarized in the accompanying contingency table. Conduct a test at  $\alpha = 0.10$  to determine whether political strategy of ethnic groups depends on world region. Support your answer with a graph.

 Click the icon to view the contingency table.

Specify the null and alternative hypotheses. Choose the correct answer below.

- A.  $H_0$ : Political strategies of different world regions are dependent.  
 $H_a$ : Political strategies of different world regions are independent.
- B.  $H_0$ : Political strategy and world region are independent.  
 $H_a$ : Political strategy and world region are dependent.
- C.  $H_0$ : Different world regions are independent of each other.  
 $H_a$ : Different world regions are dependent on each other.
- D.  $H_0$ : Different world regions are dependent on each other.  
 $H_a$ : Different world regions are independent of each other.

Find the test statistic.

$\chi^2 = \square$  (Round to the nearest hundredth as needed.)

Specify the rejection region. Select the correct choice below and fill in the answer box(es) to complete your choice.

(Round to four decimal places as needed.)

- A.  $\chi^2 < \square$  or  $\chi^2 > \square$
- B.  $\chi^2 > \square$
- C.  $\chi^2 < \square$

State the conclusion. Choose the correct answer below.

- A. Reject  $H_0$ . There is sufficient evidence to indicate that the political strategy of the ethnic groups depends on world region at  $\alpha = 0.10$ .
- B. Reject  $H_0$ . There is insufficient evidence to indicate that the political strategy of the ethnic groups depends on world region at  $\alpha = 0.10$ .
- C. Fail to reject  $H_0$ . There is sufficient evidence to indicate that the political strategy of the ethnic groups depends on world region at  $\alpha = 0.10$ .
- D. Fail to reject  $H_0$ . There is insufficient evidence to indicate that the political strategy of the ethnic groups depends on world region at  $\alpha = 0.10$ .

