Soc 102 - Final Exam (Practice)

Multiple Choice
Identify the choice that best completes the statement or answers the question.

1. The null hypothesis for an ANOVA states that __________.
   a. there are no differences between any of the population means
   b. at least one of the population means is different from the others
   c. all of the population means are different from each other
   d. None of the other 3 choices is correct.

2. In an ANOVA, which of the following is most likely to produce a large value for the F-ratio?
   a. large mean differences and small sample variances
   b. large mean differences and large sample variances
   c. small mean differences and small sample variances
   d. small mean differences and large sample variances

3. An analysis of variance is used to evaluate the mean differences for a research study comparing four treatments with a separate sample of n = 5 in each treatment. If the data produce an F-ratio of F = 3.15, then which of the following is the correct statistical decision?
   a. Reject the null hypothesis with $\alpha = .05$ but not with $\alpha = .01$.
   b. Reject the null hypothesis with either $\alpha = .05$ or $\alpha = .01$.
   c. Fail to reject the null hypothesis with either $\alpha = .05$ or $\alpha = .01$.
   d. There is not enough information to make a statistical decision.

4. Which combination of factors is most likely to produce a large value for the F-ratio and a large value for $\eta^2$?
   a. large mean differences and large sample variances
   b. large mean differences and small sample variances
   c. small mean differences and large sample variances
   d. small mean differences and small sample variances

5. An analysis of variances produces $df_{\text{between treatments}} = 2$ and $df_{\text{within treatments}} = 24$. For this analysis, what is $df_{\text{total}}$?
   a. 26
   b. 27
   c. 28
   d. cannot be determined without additional information

6. An analysis of variance is used to evaluate the mean differences for a research study comparing four treatment conditions with a separate sample of n = 5 in each treatment. The analysis produces $SS_{\text{within treatments}} = 32$, $SS_{\text{between treatments}} = 40$, and $SS_{\text{total}} = 72$. For this analysis, what is $MS_{\text{within treatments}}$?
   a. 32/5
   b. 32/4
   c. 32/16
   d. 32/20

7. In analysis of variance, the F-ratio is a ratio of __________.
   a. two (or more) sample means
   b. two variances
   c. sample means divided by sample variances
   d. None of the other 3 choices is correct.
8. In analysis of variance, large values for the sample variances will produce a large value for __________.
   a. $SS_{between\ treatments}$
   b. $SS_{within\ treatments}$
   c. $SS_{total}$
   d. Large sample variances will cause all three SS values to be large.

9. For an F-ratio with $df = 2, 10$, the critical value for a hypothesis test using $\alpha = .05$ would be __________.
   a. 4.10
   b. 7.56
   c. 19.39
   d. 99.40

10. A researcher reports an F-ratio with $df = 3, 36$ for an independent-measures experiment. How many individual subjects participated in the experiment?
    a. 36
    b. 39
    c. 40
    d. cannot be determined from the information given

11. An experiment compares two treatment conditions with a sample of $n = 20$ in each treatment. If the data are analyzed with ANOVA, the analysis would have $df_{total} =$ __________.
    a. 18
    b. 19
    c. 38
    d. 39

12. In analysis of variance, the term factor refers to __________.
    a. a dependent variable
    b. an independent (or quasi-independent) variable
    c. a treatment mean
    d. a treatment total

13. A treatment effect refers to differences between scores that are caused by the different treatment conditions. The differences (or variability) produced by treatment effects will contribute to __________.
    a. the numerator of the F-ratio
    b. the denominator of the F-ratio
    c. both the numerator and the denominator of the F-ratio
    d. Treatment effects do not contribute to the F-ratio because they are removed before the F-ratio is computed.

14. Under what circumstances are post tests necessary?
    a. reject the null hypothesis with $k = 2$ treatments
    b. reject the null hypothesis with $k > 2$ treatments
    c. fail to reject the null hypothesis with $k = 2$ treatments
    d. fail to reject the null hypothesis with $k > 2$ treatments

15. In general the distribution of F-ratios is __________.
    a. symmetrical with a mean of zero
    b. positively skewed with all values greater than or equal to zero
    c. negatively skewed with all values greater than or equal to zero
    d. symmetrical with a mean equal to $df_{between}$
16. A research study compares three treatments with $n = 5$ in each treatment. If the SS values for the three treatments are 25, 20, and 15, then the analysis of variance would produce SS\text{within} equal to 
\begin{enumerate} 
\item a. 12 
\item b. 20 
\item c. 60 
\item d. cannot be determined from the information given 
\end{enumerate}

17. The numerical value for a correlation 
\begin{enumerate} 
\item a. can never be greater than 1.00 
\item b. can never be less than \(-1.00\) 
\item c. can never be greater than 1.00 and can never be less than \(-1.00\) 
\item d. can be greater than 1.00 and can be less than \(-1.00\) 
\end{enumerate}

18. A Pearson correlation of $r = -0.85$ indicates that a graph of the data would show 
\begin{enumerate} 
\item a. points clustered close to a line that slopes up to the right 
\item b. points clustered close to a line that slopes down to the right 
\item c. points widely scattered around a line that slopes up to the right 
\item d. points widely scattered around a line that slopes down to the right 
\end{enumerate}

19. A scatterplot shows a set of data points that are widely scattered around a line that slopes up to the right. Which of the following values would be closest to the correlation for these data?
\begin{enumerate} 
\item a. 0.80 
\item b. 0.40 
\item c. \(-0.40\) 
\item d. \(-0.80\) 
\end{enumerate}

20. For the following data, SP equals 
\begin{tabular}{|c|c|} 
\hline 
X & Y \\
\hline 
2 & 4 \\
5 & 2 \\
3 & 5 \\
2 & 5 \\
\hline 
\end{tabular}

\begin{enumerate} 
\item a. 6 
\item b. \(-5\) 
\item c. 43 
\item d. None of the other 3 choices is correct. 
\end{enumerate}

21. For a hypothesis test for the Pearson correlation, the null hypothesis states that 
\begin{enumerate} 
\item a. there is a non-zero correlation for the general population 
\item b. the population correlation is zero 
\item c. there is a non-zero correlation for the sample 
\item d. the sample correlation is zero 
\end{enumerate}

22. In the general linear equation, $Y = bX + a$, what is the value of $b$ called?
\begin{enumerate} 
\item a. X intercept 
\item b. Y intercept 
\item c. correlation between X and Y 
\item d. slope 
\end{enumerate}
Short Answer

23. Complete the following ANOVA table for a study with $k = 3$ and $N = 98$

<table>
<thead>
<tr>
<th>Source</th>
<th>SS</th>
<th>df</th>
<th>MS</th>
<th>F</th>
</tr>
</thead>
<tbody>
<tr>
<td>Between</td>
<td></td>
<td></td>
<td>12.50</td>
<td></td>
</tr>
<tr>
<td>Within</td>
<td>190</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Are the results significant? YES / NO (circle one)

How would you report the results ____________________________________

24. The data below represent the number of iPods sold in one day, for three different locations within a store. Do the data indicate any significant differences between these three locations in terms of sales? (Fill in all of the blanks)

<table>
<thead>
<tr>
<th>Location A</th>
<th>Location B</th>
<th>Location C</th>
<th>$\Sigma X^2$</th>
<th>G</th>
<th>N</th>
<th>k</th>
</tr>
</thead>
<tbody>
<tr>
<td>10</td>
<td>8</td>
<td>11</td>
<td>11</td>
<td>5</td>
<td>7</td>
<td>8</td>
</tr>
<tr>
<td>8</td>
<td>4</td>
<td>6</td>
<td>5</td>
<td>6</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>7</td>
<td>5</td>
<td>2</td>
<td>2</td>
<td>7</td>
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<td>7</td>
<td>2</td>
<td>2</td>
<td>8</td>
<td>2</td>
<td>2</td>
</tr>
</tbody>
</table>

| Total     |            |            |              |   |   |   |
| SS        |            |            |              |   |   |   |
| n         |            |            |              |   |   |   |
| M         |            |            |              |   |   |   |

Complete the following ANOVA table using the data above.

<table>
<thead>
<tr>
<th>Source</th>
<th>SS</th>
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<th>MS</th>
<th>F</th>
</tr>
</thead>
<tbody>
<tr>
<td>Between</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Within</td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Are the results significant? YES / NO (circle one)

How would you report the results ____________________________________
25. For the data below, compute the Pearson correlation. Then generate the regression equation, and predict the value of Y when X = 2

<table>
<thead>
<tr>
<th>X</th>
<th>Y</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>7</td>
</tr>
<tr>
<td>5</td>
<td>8</td>
</tr>
<tr>
<td>3</td>
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<td>4</td>
<td>8</td>
</tr>
<tr>
<td>8</td>
<td>5</td>
</tr>
</tbody>
</table>

\[
\Sigma X = \underline{\text{______}} \quad \Sigma Y = \underline{\text{______}} \quad \Sigma X^2 = \underline{\text{______}} \quad \Sigma Y^2 = \underline{\text{______}}
\]

\[
\Sigma XY = \underline{\text{______}} \quad SS_X = \underline{\text{______}} \quad SS_Y = \underline{\text{______}} \quad SP = \underline{\text{______}}
\]

\[
r = \underline{\text{______}} \quad M_X = \underline{\text{______}} \quad M_Y = \underline{\text{______}} \quad b = \underline{\text{______}}
\]

\[
a = \underline{\text{______}} \quad Y' = \underline{\text{__________________________}}
\]

for X = 2: \( Y' = \underline{\text{______}} \)
Soc 102 - Final Exam (Practice)
Answer Section

MULTIPLE CHOICE

1. ANS: A  REF: 328
2. ANS: A  REF: 349
3. ANS: C  REF: 344
4. ANS: B  REF: 347
5. ANS: A  REF: 340
6. ANS: C  REF: 341
7. ANS: B  REF: 329
8. ANS: B  REF: 337
9. ANS: A  REF: 344
10. ANS: C  REF: 339
11. ANS: D  REF: 339
12. ANS: B  REF: 328
13. ANS: A  REF: 333
14. ANS: B  REF: 354
15. ANS: B  REF: 343
16. ANS: C  REF: 337
17. ANS: C  REF: 414
18. ANS: B  REF: 414
19. ANS: B  REF: 414
20. ANS: B  REF: 415
21. ANS: B  REF: 426
22. ANS: D  REF: 439

SHORT ANSWER

23. ANS:

<table>
<thead>
<tr>
<th>Source</th>
<th>SS</th>
<th>df</th>
<th>MS</th>
<th>F</th>
</tr>
</thead>
<tbody>
<tr>
<td>Between</td>
<td>25</td>
<td>2</td>
<td>12.50</td>
<td>6.25</td>
</tr>
<tr>
<td>Within</td>
<td>190</td>
<td>95</td>
<td>2.00</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>215</td>
<td>97</td>
<td></td>
<td></td>
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</tbody>
</table>

Are the results significant? YES

How would you report the results F(2,95) = 6.25, p < .01
24. ANS:

<table>
<thead>
<tr>
<th>Location</th>
<th>A</th>
<th>B</th>
<th>C</th>
</tr>
</thead>
<tbody>
<tr>
<td>10</td>
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<tr>
<td>8</td>
<td>7</td>
<td>2</td>
<td></td>
</tr>
</tbody>
</table>

**Source** | SS | df | MS | F
---|---|---|---|---
Between | 65.2 | 2 | 32.6 | 13.58
Within  | 28.8 | 12 | 2.4 |
Total   | 94  | 14 |

Are the results significant? YES

How would you report the results F(2,12) = 13.58, p < .01

25. ANS:

\[ \Sigma X = 28 \quad \Sigma Y = 43 \quad \Sigma X^2 = 146 \quad \Sigma Y^2 = 315 \]

\[ \Sigma XY = 192 \quad SS_X = 15.333 \quad SS_Y = 6.833 \quad SP = -8.667 \]

\[ r = -0.847 \quad M_X = 4.667 \quad M_Y = 7.167 \quad b = -0.565 \]

\[ a = 9.803 \quad Y' = (-0.565)X + 9.803 \]

for X = 2: Y' = 8.67