
All Sections

Make sure that your scantron matches the color of this page. Read ALL directions carefully before beginning the exam.

On your scantron, encode your name as specified on the scantron, encode your Dawgtag as your “Identification Number,” and encode your Section # in the columns “OP” under the area labeled “Special Codes.”

The last page of this exam is the formula sheet and z-score table. You may tear this page out of the exam for your reference.

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

Use the following numbers to answer questions #1-3.

9  17  11  13  23  5  7  11  21  31  6

1. What is the median?
   a) 5    b) 11    c) 10    d) 12    e) None of these

2. What is the mode?
   a) 11    b) 10    c) 11.5    d) 12    e) None of these

3. What is the value of the 3rd Quartile?
   a) 31    b) 11    c) 7    d) 21    e) None of these

4. How many edges are in a tree with 17 vertices?
   a) 17    b) 16    c) 17!    d) \( \frac{17!}{2} \)    e) None of these

5. The first 9 digits of an ISBN-10 are 1-027-31685. What is the correct check digit?
   a) 2    b) 1    c) 9    d) 7    e) None of these
6. How many check digits are in a (4,9)-block code?
   a) 4  b) 9  c) 5  d) 13  e) None of these


8. Which algorithm guarantees the minimum cost Hamiltonian Circuit?
   a) Brute Force  b) Nearest Neighbor  c) Cheapest Link  d) Kruskal's Algorithm  e) None of these

9. What type of study would be most appropriate for the following scenario?

   The FDA has approved human trials for a new drug. The company administering tests gave half of the participants a placebo and the other half of the participants the drug. Only the administrators know which participants have the drug and who has the placebo.

   a) Experiment with single-blind  b) Experiment with double-blind  c) Experiment with no blinding  d) Case-control study  e) None of these

Use the following information to answer questions #10-13.

A bag contains 4 red marbles, 5 blue marbles, and 2 green marbles.

10. What is the probability of choosing a yellow marble and then a green marble without replacement?
   a) $4/55$  b) $1/110$  c) $4/110$  d) $8/121$  e) None of these

11. What are the odds against drawing a blue marble?
   a) 5:6  b) 6:5  c) 5:11  d) 11:5  e) None of these

12. What is the probability of drawing a marble that is NOT red?
   a) $7/4$  b) $4/7$  c) $4/11$  d) $7/11$  e) None of these

13. Which of the following is most likely to happen if a single marble is chosen?
   a) The marble is not red.  b) The marble is blue.  c) The marble is not green.  d) The marble is red.  e) None of these
14. Given the following generator matrix, find the codeword for \(0110\).

\[
\begin{pmatrix}
1 & 0 & 0 & 0 & 1 & 0 & 1 & 0 \\
0 & 1 & 0 & 0 & 1 & 0 & 0 & 1 \\
0 & 0 & 1 & 0 & 0 & 1 & 0 & 1 \\
0 & 0 & 0 & 1 & 0 & 1 & 1 & 0
\end{pmatrix}
\]

f) \(01101100\)  
g) \(11011000\)  
h) \(0111100\)  
i) \(01100100\)  
j) None of these

15. Leanne borrows $5,000 at 7.1% simple interest for 2 years. What is the total amount due after 2 years?

a) \$5,710.00  
b) \$5,762.88  
c) \$710.00  
d) \$5367.91  
e) None of these

16. Given the following edge set, \(E=\{AB, AC, AD, AE, BC, CE, EE, DE\}\), vertex C is adjacent to what vertices?

a) B  
b) A  
c) E  
d) All of these  
e) None of these

17. A radio station polled 312 listeners. They found that 52% of these listeners were in favor of a new program. Find the 95% confidence interval for the listeners in favor of the new program.

a) \(46.34\%-52\%\)  
b) \(46.34\%-57.66\%\)  
c) \(11.32\%\)  
d) \(52\%-57.66\%\)  
e) None of these

18. Determine the sampling method for the following scenario.

A list of 1500 alumni was given to a call center. Every 3rd alum is chosen to be called to ask for donations.

a) Simple random sample  
b) Stratified random sample  
c) Cluster sample  
d) Systematic sampling  
e) None of these
19. In order for a graph to have an Euler path, it must have
   a) Exactly 2 odd vertices  b) Exactly 2 even vertices  c) All vertices with even degree  d) All vertices with odd degree  e) None of these

20. Janet paid $3,635.02 on a 6-year loan at 3.2% simple interest. How much did she originally borrow?  
   *Round to the nearest dollar*
   a) $3,050  b) $4404  c) $635  d) $5039  e) None of these

21. What is the Hamming Distance between the coordinates u=11010011 and v=10001001?
   a) 3  b) 2  c) 5  d) 4  e) None of these

22. Determine the effective annual yield for 6.5% compounded monthly. *Round to the nearest tenth of a percent*
   a) 6.5%  b) 6.6%  c) 6.7%  d) 6.8%  e) None of these

23. What is the fewest number of edges that must be duplicated to generate an optimal Eulerization of the given graph?

   a) 2  b) 3  c) 4  d) 5  e) None of these
24. In the given probability distribution, \( x \) represents the number of cars registered per household in a certain area. Find the mean number of registered cars per household.

<table>
<thead>
<tr>
<th>( x )</th>
<th>( P(x) )</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>0.3</td>
</tr>
<tr>
<td>1</td>
<td>0.41</td>
</tr>
<tr>
<td>2</td>
<td>0.2</td>
</tr>
<tr>
<td>3</td>
<td>0.09</td>
</tr>
</tbody>
</table>

a) 1  
b) \textbf{1.08}  
c) 0.8  
d) 0.25  
e) None of these

25. Use Kruskal’s algorithm to find the weight of the minimum cost spanning tree of the given graph.

![Graph with weights]

a) 37  
b) 40  
c) \textbf{31}  
d) 28  
e) None of these

26. How much money should be deposited today into an account that earns 5.5% interest compounded quarterly so that it will accumulate to $10,000 in 12 years? *Round to the nearest cent*

a) $20.62  
b) $2,719.39  
c) $5,191.81  
d) $5,214.78  
e) None of these

27. Given the following sets, \( A = \{1, 2, 3, 4, 5, 6, 7, 8, 9\} \) and \( B = \{\text{multiples of 2}\} \), what is \( P(B|A) \) (i.e. what is the probability of selecting a multiple of two given that the number is in Set \( A \))?

a) \textbf{4/9}  
b) \frac{1}{2}  
c) \frac{5}{9}  
d) \frac{2}{3}  
e) None of these
28. Suppose that a 13-person committee needs to select one of the alternatives A, B, or C for a company party. The preference ballots are listed in the following table. Which choice is the Borda Count winner?

<table>
<thead>
<tr>
<th># of Votes</th>
<th>5</th>
<th>3</th>
<th>3</th>
<th>2</th>
</tr>
</thead>
<tbody>
<tr>
<td>1&lt;sup&gt;st&lt;/sup&gt;</td>
<td>C</td>
<td>B</td>
<td>A</td>
<td>C</td>
</tr>
<tr>
<td>2&lt;sup&gt;nd&lt;/sup&gt;</td>
<td>A</td>
<td>A</td>
<td>C</td>
<td>B</td>
</tr>
<tr>
<td>3&lt;sup&gt;rd&lt;/sup&gt;</td>
<td>B</td>
<td>C</td>
<td>B</td>
<td>A</td>
</tr>
</tbody>
</table>

a) A  

b) B  

c) C  

d) There is a tie

29. A savings account pays 6.5% interest compounded monthly. If you deposit $400 into this account, how much will you have after 7 years? *Round to the nearest cent*

a) $630.47  
b) $629.70  
c) $33607.75  
d) $628.93  
e) None of these

30. What is the minimum cost Hamiltonian circuit generated by the Cheapest-Link Algorithm for the given graph?

A

B

C

D

E

8 10 12 11 9 13 17 19

a) ABEDC  
b) **ABEDCA**  
c) ABCDEA  
d) ADEBCA  
e) None of these

31. James takes out a conventional installment loan for 7 years at 6.5% interest compounded monthly. What are his monthly payments if he borrows $16,500? *Round to the nearest cent*

a) $196.43  
b) $2357.14  
c) $1375  
d) **$245.02**  
e) None of these
32. The heights of adults have a distribution that can be approximated by a normal curve with a mean of 70 inches and a standard deviation of 4 inches. About what percentage of adults are taller than 65 inches?

   a) -1.25%    b) 1.25%    c) 9.68%    d) 90.32%    e) None of these

33. Find the remainder when 71 is divided by 6.

   a) 5    b) 4    c) 3    d) 7    e) None of these

34. The Nearest-Neighbor tour starting at vertex B in the following graph is given by:

   ![Graph]

   a) BEADCA    b) BACDE    c) BADCEB    d) BACDEB    e) None of these

35. Nineteen voters must choose between alternatives A, B, C, or D. Their votes are summarized in the following preference table. Which candidate is eliminated second according to the method of plurality with elimination?

<table>
<thead>
<tr>
<th># of Votes</th>
<th>7</th>
<th>6</th>
<th>4</th>
<th>2</th>
</tr>
</thead>
<tbody>
<tr>
<td>1&lt;sup&gt;ST&lt;/sup&gt;</td>
<td>C</td>
<td>A</td>
<td>B</td>
<td>D</td>
</tr>
<tr>
<td>2&lt;sup&gt;ND&lt;/sup&gt;</td>
<td>D</td>
<td>D</td>
<td>C</td>
<td>C</td>
</tr>
<tr>
<td>3&lt;sup&gt;RD&lt;/sup&gt;</td>
<td>B</td>
<td>C</td>
<td>D</td>
<td>B</td>
</tr>
<tr>
<td>4&lt;sup&gt;TH&lt;/sup&gt;</td>
<td>A</td>
<td>B</td>
<td>A</td>
<td>A</td>
</tr>
</tbody>
</table>

   a) A    b) B    c) C    d) D    e) There is a tie

36. Suppose the results of a study have several outliers to the left of the mean. The resulting graph of the data would be

   a) Left-skewed    b) Right-skewed    c) Bi-modal    d) Normally distributed    e) None of these
37. Compute the standard deviation for the following data set. *Round to the nearest hundredth*

| 6 | 7 | 11 | 5 | 12 |

a) 8.20  
b) 41.80  
c) 8.36  
d) 3.23  
e) None of these

38. Suppose a 17-person committee needs to select one of the alternatives A, B, or C. Their votes are summarized in the following table. Which choice is the winner using the plurality method?

<table>
<thead>
<tr>
<th># of Votes</th>
<th>9</th>
<th>3</th>
<th>3</th>
<th>2</th>
</tr>
</thead>
<tbody>
<tr>
<td>1st</td>
<td>C</td>
<td>B</td>
<td>A</td>
<td>A</td>
</tr>
<tr>
<td>2nd</td>
<td>A</td>
<td>C</td>
<td>C</td>
<td>B</td>
</tr>
<tr>
<td>3rd</td>
<td>B</td>
<td>A</td>
<td>B</td>
<td>C</td>
</tr>
</tbody>
</table>

a) A  
b) B  
c) C  
d) There is a tie  
e) No winner

39. Suppose the check matrix for a (3,7)-block code is as follows. Decode the word 1001110 and determine if it is a codeword or if it differs from a codeword in a single digit. The decoded message is:

\[
\begin{array}{cccc}
1 & 0 & 1 & 1 \\
0 & 1 & 0 & 1 \\
1 & 0 & 0 & 0 \\
1 & 0 & 0 & 0 \\
0 & 1 & 0 & 0 \\
0 & 0 & 1 & 0 \\
0 & 0 & 0 & 1 \\
\end{array}
\]

a) 111  
b) 110  
c) 101  
d) 011  
e) None of these

40. A distribution of ACT scores is normally distributed with a mean of 26 and a standard deviation of 4. Approximately what percent of students should have scored between 18 and 34?

a) 34%  
b) 68%  
c) 47.5%  
d) 95%  
e) None of these