MAT 307: Exam 1 **Name:** _____
Spring – 2023
03/03/2023
85 Minutes

Write your name on the appropriate line on the exam cover sheet. This exam contains **??** pages (including this cover page) and **??** questions. Check that you have every page of the exam. Answer the questions in the spaces provided on the question sheets. Be sure to answer every part of each question and show all your work.

1. Let $A = \{1, 2, 3, 4, 5\}$ and $B = \{3, 4, 5, 6, 7\}$. Which of the following is $A \cup B$?

   A. $\{4, 5\}$

   B. $\{3, 4, 5\}$

   C. $\{1, 2, 6, 7\}$

   D. $\{1, 2, 3, 4, 5, 6, 7\}$

2. How many possible unique arrangements of letters are there using the letters of the word 'endless'?

   A. 7

   B. 21

   C. 1260

   D. 5040

3. If you are dealt five cards from a deck of cards, approximately what is the probability that you are dealt four kings?

   A. 0.00002

   B. 0.019

   C. 0.077

   D. 0.307

4. Alice and Bob take an exam. Alice received a 79 on her exam while Bob received a 67 on his exam. Alice's exam was normally distributed with mean 85 and standard deviation 1.5 while Bob's exam was normally distributed with mean 60 and standard deviation 5. Which of the following statements is most accurate?

   A. Alice did better on her exam compared to others but Bob's score was more 'unusual' compared to others.

   B. Bob did better on his exam compared to others but Alice's score was more 'unusual' compared to others.

   C. Alice's exam score was better compared to others and her exam score was more 'unusual' compared to others.

   D. Bob's exam score was better compared to others and her exam score was more 'unusual' compared to others.

5. Let $A = \{10, 1, 5, 4, 6\}$ and $B = \{3, 5, 0, -2, 6\}$. Which of the following is the set $A - B$?

   A. $\{1, 4, 10\}$

   B. $\{7, -4, 5, 6, 0\}$

   C. $\{-4, 0, 5, 6, 7\}$

   D. $\{-2, 0, 1, 3, 4, 10\}$

6. Mr. Lambert has 40 students in his classroom. Of these students, 13 have been to a zoo, 15 have been to a museum, and 5 have been to both. Which of the following is the number of students that have been to neither?

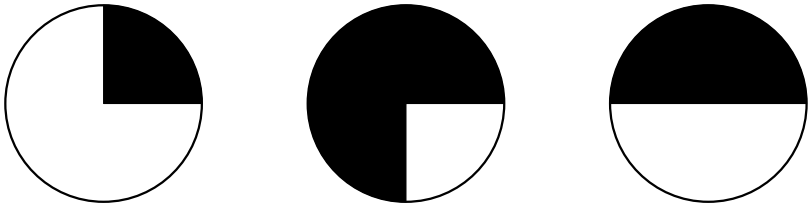
   A. 7

   B. 12

   C. 17

   D. 35

7. There are three spinners, shown below with portions of each spinner colored white or black.



   If you spin each of these three spinners, one after the other, what is the probability that each spinner lands in the dark shaded area?

   A. 0.09375

   B. 0.50000

   C. 0.66667

   D. 0.75000

8. Let S be the set of counting numbers from 1 to 100 (including 1 and 100). Suppose you found the mean, median, IQR, and standard deviation of S. Which of the following statements is most accurate if you were to compute these statistics after including the number 1,200 in the set S?

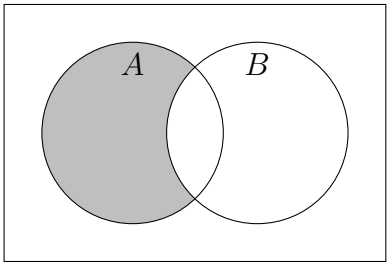
   A. The mean would change more than the median.

   B. The median would change more than the mean.

   C. The mean and median would change by the same amount.

   D. The mean would change but the median would not.

9. Which of the following represents the region shaded in the Venn diagram below?



A. A

B. $A \cap B$

C. $A - B$

D. $(A \cup B) - (A \cap B)$

10. Samantha, Timothy, Ben, and Justin are lining up at the cafeteria for lunch. How many arrangements are there for them to line up?

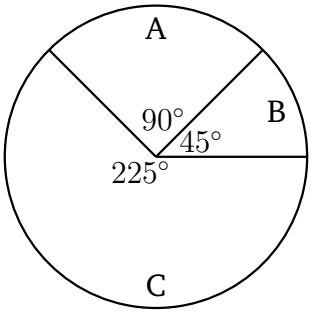
A. 1

B. 4

C. 10

D. 24

11. Shown below is a spinner with different regions labeled, as well as the angles used to form those regions.



If you spin this wheel, what is the probability that the spinner lands in the region labeled 'C'?

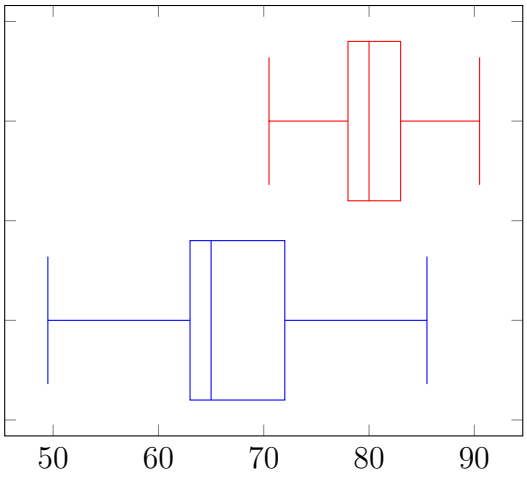
A. $\frac{1}{2}$

B. $\frac{2}{3}$

C. $\frac{5}{8}$

D. $\frac{7}{8}$

12. Below are box plots for the exam scores for students in a Mathematics class, broken down by gender. The women are represented by red and men by blue.



Which of the following statements is most accurate?

(a) On average, the women did better and the men had more varied scores.

(b) On average, the men did better and the women had more varied scores.

(c) On average, the women did better and the men had less varied scores.

(d) On average, the men did better and the women had less varied scores.

13. Let C be the set of cars, O be the set of objects that were made more than five years ago, and R be the set of red objects. Which of the following best describes an element of $(C \cap O^c) \cup (C \cap R)$?

    A. A red car that was made more than 5 years ago.

    B. A red car that was made less than 5 years ago.

    C. A red car or a car made more than 5 years ago.

    D. A red car or a car made less than 5 years ago.

14. How many passwords with 6 characters can be made using the first five letters of the alphabet and the numbers 0–4?

    A. 10

    B. 531,441

    C. 1,000,000

    D. 3,628,800

15. CHART PROB

16. Which of the following would not be appropriate to use to represent the set of average monthly temperatures from January 2000 to December 2019?

    A. A dot plot.

    B. A box plot.

C. A stem-and-leaf plot.

D. A histogram.

17. Which of the following is the cardinality of the set of even numbers from 10 to 620 (including 0 and 100)?

    A. 290

    B. 305

    C. 306

    D. 610

18. 14.2, 15

19. CHART PROB

20. Robert calculates that, on average, they make $47.50 in profit for each person that attends one of the baseball games at the stadium where he works. If there were 8,400 people that attended the last game, approximately how much profit did the stadium make?

    A. $8,400

    B. $399,000

    C. $420,000

    D. $1,500,000

21. If $A = \{a, b, a, c, d, e\}$ and $B = \{a, b, e, e\}$, which of the following is the set $A \cap B$?

    A. $\{a, a, b\}$

    B. $\{a, b, e\}$

    C. $\{a, a, b, d, e, e\}$

    D. None of the above

22. What is the cardinality of the set $A = \{1, 1, 2, 2, 3, 3, \ldots, 10, 10\}$?

    A. 4

    B. 8

    C. 10

    D. 20

23. 6 chart prob

24. 6 which result/not in bias

25. 7 cardinality set difference

26. 6 comb
27. 7 venn prob
28. 8 z-score special sections
29. 8 complement of set in interval
30. 8 perm
31. 9 dice prob roll
32. 9 sketch normal which most likely mean stdev
33. 5 cardinality of set with repeats
34. 7 comb
35. 10 dice prob roll
36. 10 which is outlier for data set (iqr)
37. 9 whether element
38. 9 perm
39. 11 marble prob
40. 12 add data value happens mean & stdev
41. 10 whether subset or equal
42. 10 random COUNT
43. 8 ven prob
44. 14 for data set which largest mean, med, mod, #
45. prob disjoint indep
46. 11 which 5-number summary
47. 15 chart problem
48. 13 boxplot find mean iqr
49. set
50. other