Sample of Final Exam Problems

Math 125: Fall 2023

Each problem is multiple choice. $4\frac{1}{2}$ points for a correct response, 1 point deducted for a wrong answer

In Problem 4, count each part 1/3 as much: $1\frac{1}{2}$ points for a correct answer, 1/3 point deducted for a wrong answer.

(The actual final will have 22 somewhat similar questions, each with exactly 5 choices for the correct answer, and no multiple parts as in problem 4.)

For Problems 1 and 2.

A group of 40,000 families were sorted by size. A histogram was made from that distribution. In the category of size 5 to 7 inclusive, there are 1,476 families.

1. The height of that block for 5 to 7 inclusive is:

(A) 3.69% (B) 3.69% per person (C) 1.845% per person (D) 1.23% per person (E) 0.9225% per person

2. The area of that block (from 5 to 7) represents:

(A) family size (B) percent per family member (C) density
(D) percent of families (E) width of the base

3. True or false: in a block of a histogram, the height of the block represents the percent of the population and the area of the block represents the density.

4. A list has 9 entries, numbered 2 to 10.

   (a) Convert the largest number on the list to standard units.

   (A) 1.333 (B) 1.429 (C) 1.549 (D) 1.6 (E) 2

   (b) What percent of the entries were within 1.25 SDs of the average?

   (A) 44% (B) 56% (C) 67% (D) 78% (E) 89%

   (c) If a list followed the normal curve, what percent would be within 1.25 SDs of the average?

   (A) 34% (B) 39% (C) 68% (D) 79% (E) 89%

5. The average height for a group of women was 63.274 inches and the SD was 2.8934 inches. The height of a certain woman was 0.5 SDs above average.

   What is her height in standard units?

   (A) 0.5 (B) 1 (C) 1.4467 (D) 2 (E) 2.8934 (F) 64.72

6. The average height for a group of women was 65 inches and the SD was 3.32 inches.

   Using the normal curve, an estimate for the percent of women with heights between 64 and 68 inches is:

   (A) 13% (B) 40% (C) 43% (D) 57% (E) 87%

7.

x	y
6	3
8	11
2	12
10	9
14	15

Find the correlation coefficient, r, for the above data set.

(A) 0.0234 (B) 0.225 (C) 0.375 (D) 0.525 (E) 0.625

For problems 8 to 13

A group of men in a survey produced the following data:

average weight = 175 pounds, SD = 45 pounds
average height = 69 inches, SD = 3 inches, $r = 0.42$

8. A man picked at random from the above group weighs 225 pounds. Predict his height.

   (A) 67.6 inches (B) 69 inches (C) 69.47 inches (D) 70.4 inches (E) 72.333 inches

9. A man who weighed 225 pounds and was 72 inches tall gained 20 pounds and now weighs 245 pounds. What's his new height?

   (A) 72 inches (B) 72.19 inches (C) 72.56 inches (D) 73.33 inches (E) 75 inches

10. Find the root-mean-square error of the regression line for predicting height from weight.

    (A) 1.74 inches (B) 2.4708 inches (C) 2.72257 inches (D) 3 inches (E) 40.839 pounds

11. Find the regression equation for predicting height in inches from weight in pounds.

    (A) height = 0.028 × weight + 64.1 (B) height = 0.0667 × weight + 57.3275
    (C) height = 0.15873 × weight + 41.222 (D) height = 6.3 × weight − 259.7
    (E) height = 15 × weight − 860

12. Use the equation to predict the height (in inches) for a man whose weight was 225 pounds. Show the calculation resulting from plugging in the given value.

    (A) $0.028(225) + 64.1 = 70.4$ (B) $0.0667(225) + 57.3275 = 72.335$
    (C) $0.15873(225) + 41.222 = 76.93625$ (D) $6.3(225) - 259.7 = 1157.8$ (E) $15(225) - 860 = 2515$

13. Ralph is 6 inches taller than Morton. How much more is he predicted to weigh?

    (A) 2.52 pounds (B) 6.3 pounds (C) 37.8 pounds (D) 45 pounds (E) 90 pounds

For Problems 14 and 15:

A champion dart player has a 23% chance of hitting the bulls eye. He throws four darts, randomly and independently.

14. The chance that at least one of the four throws results in a bullseye is around:

    (A) 0.3% (B) 23% (C) 35% (D) 65% (E) 92% (F) 99.7%

15. The chance that exactly one of the four throws results in a bullseye is around:

    (A) 0.3% (B) 3.7% (C) 10.5% (D) 23% (E) 35% (F) 42%

16. This problem is a challenge problem.

    A fair die is rolled twice. Event A is getting a four on the first roll. Event B is getting different numbers on the two rolls.

    Find the chance of A or B (or both). That is the probability of at least one of the results: A, B.

    (A) 1/6 (B) 1/3 (C) 5/36 (D) 11/36 (E) 5/6 (F) 31/36 (G) 1

17. A fair coin is tossed 350 times. Estimate the chance of getting exactly 182 heads.

    (A) 1.84% (B) 3% (C) 3.68% (D) 6% (E) 52%

18. A fair coin is tossed and the number of tosses gets larger and larger.

    Only one of the following is correct? State the correct letter.

    (A) The difference between the number of heads observed and the expected number of heads and the difference between the percentage of heads observed and 50% both get smaller.

    (B) The difference between the number of heads observed and the expected number of heads and the difference between the percentage of heads observed and 50% both get larger.

    (C) The difference between the number of heads observed and the expected number of heads gets smaller, while the difference between the percentage of heads observed and 50% gets larger.

    (D) The difference between the number of heads observed and the expected number of heads gets larger, while the difference between the percentage of heads observed and 50% gets smaller.

    (E) None of the four above statements are true.

19. A standard deck contains 52 cards: 20 even-numbered cards and 32 cards that are not even-numbered. Two hundred draws are made at random with replacement from such a deck.

    The percentage of even-numbered cards drawn should end up around 38.46%, give or take:

    (A) 0.118% (B) 1.674% (C) 2.7196% (D) 3.44% (E) 5.439%

20. A simple random sample of 3,500 people is taken in a large town to estimate the percentage of people (age 18 and over in that town) who read newspapers. It turns out that 2310 of the people in the sample are newspaper readers. A 95%-confidence interval for the percentage of newspaper readers in the entire town is:

(A) 62.8 to 69.2% (B) 64.4 to 67.6% (C) 64.9 to 67.1% (D) 65.2 to 66.8% (E) 65.6 to 66.4%

21. A simple random sample of 4,000 households from the 3,250,00 households in New York City was taken. In the sample, the average household income was $104,000, with an SD of $36,300.

    The $104,000 is off the average income in the entire city by about:

    (A) $9 (B) $26 (C) $574 (D) $1644.38 (E) $36,300 (F) 3.846%

22. A box contains a large number of tickets. The numbers on these tickets average out to 120, and the SD is 20.

    Eighty-one (81) tickets are drawn at random with replacement.

    Find the chance that the average of the draws will be in the range 117 to 123.

    (A) 5.96% (B) 11.92% (C) 41.15% (D) 82.30% (E) 99.31%

23. A patient is weighed 30 times by a nurse. The 30 readings average 187.63 pounds, and the SD of the 30 readings is 0.65 pounds. (Assume the Gauss model.)

    The actual weight of the patient is off from 187.63 pounds by about how much?

(A) 0.0217 lbs (B) 0.119 lbs (C) 0.65 lbs (D) 3.56 lbs (E) 6.25 lbs (F) 19.5 lbs (G) 34.256 lbs

24. A coin was tossed 55 times and got 34 heads.

    Set up an appropriate test of hypotheses. Then find P and decide if the coin is fair or gets too many heads.

    (The histogram has large blocks; apply the continuity correction ($\pm 1/2$) to any endpoints used.)

    (A) $P = 1.61\%$, not fair (B) $P = 4\%$, not fair (C) $P = 5.48\%$, not fair
    (D) $P = 5.48\%$, fair (E) $P = 10.96\%$, fair

25. A gambler is accused of using a loaded die, but he pleads innocent. A record has been kept of the last 600 throws. There is disagreement about how to interpret the data and a statistician is called in.

The observed frequencies for the six numbers on the die are summarized in this table.

Value	*Observed frequency*
1	87
2	115
3	94
4	125
5	78
6	101

A χ^2-test of the null hypothesis that the die is fair was made. State P and the conclusion.

(A) 1%, unfair (B) 2%, unfair (C) 15.4%, unfair (D) 15.4%, fair (E) 75%, fair