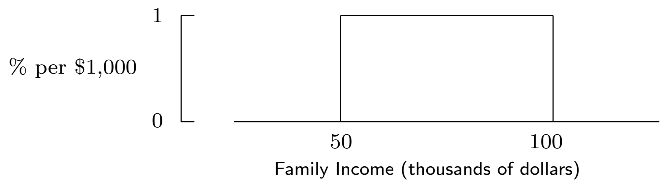
Conflict Final Examination

(May 23)

Math 125, Spring 2025

Multiple Choice. 5 points for each correct response, 1 point deducted for each wrong answer

1. Someone has sketched one block of a family-income histogram for a wealthy suburb. About what percentage of the families in this suburb had incomes between \$50,000 and \$65,000 a year?



   (A) 7.5% (B) 15% (C) 30% (D) 50% (E) 65%

2. Find the SD of the list $\{1, 2, 3\}$.

   (A) 1/2 (B) 3/4 (C) $\sqrt{6}/3$ (D) $\sqrt{3}/2$ (E) 1

3. An aerobic study involves 1,050 men, age 18 to 24. The histogram of systolic blood pressure for these men followed the normal curve closely. The average is 120 mm, and 238 of the men have blood pressures above 135 mm. How many men have blood pressures above 150 mm?

   (A) 70 (B) 119 (C) 167 (D) 202 (E) 494

4. Among freshmen at a certain university, scores on the Math SAT followed the normal curve, with an average of 550 and an SD of 100.

   A student who scored 455 on the Math SAT was at about the _______th percentile of the score distribution.

   (A) 9th (B) 13th (C) 17th (D) 33rd (E) 34th

5. Find the correlation coefficient, r, for the following data set.

A	B
-1	2
0	0
1	4

   (A) -1 (B) $-1/3$ (C) 0 (D) 1/3 (E) 1/2

6. The correlation between height and weight among men age 18–74 in the U.S. is about 0.40.

   Which of the following five statements is true?

   (A) Taller men tend to be lighter.

   (B) The correlation between weight and height for men age 18–74 is about -0.40.

   (C) The correlation between height and weight is the same, no matter what units of measurement are used.

   (D) Lighter men tend to be taller.

   (E) If someone eats more and puts on 10 pounds, he is likely to get somewhat taller.

7. For the first year students at a certain university, the average GPA was 2.6 and the SD was 0.6. The correlation between SAT scores and first-year GPA was 0.5. The SAT scores followed the normal curve.

   Estimate the average first-year GPA for students whose percentile rank on the SAT was 84%.

   (A) 2.6 (B) 2.75 (C) 2.9 (D) 3.05 (E) 3.2

8. A statistical analysis was made of the midterm and final scores in large course, with the following results:

$$\text{average midterm score} \approx 50, \quad \text{SD} \approx 25$$
$$\text{average final score} \approx 55, \quad \text{SD} \approx 15, \quad r \approx 0.80$$

   The scatter diagram was football-shaped. For each student, the final score was predicted from the midterm using the regression line.

   For about 1/3 of the students, the prediction for the final score was off by more than ____________ points.

   (A) 4.5 (B) 9 (C) 12 (D) 18 (E) 27

9. Every week you buy a ticket in a lottery that offers one chance in a hundred of winning. What is the chance that you never win, even if you keep this up for one hundred weeks? Find a numeric answer rounded to the nearest one percent (nearest 1%).

   (A) 37% (B) 48% (C) 59% (D) 63% (E) 99%

10. A box has five tickets, two marked with a star, and the other three blank:

    [★] [★] [ ] [ ] [ ]

    Two draws are made at random with replacement from this box.

    The chance of getting a blank at least once in the two draws is:

    (A) 36% (B) 60% (C) 64% (D) 80% (E) 84%

11. A box contains seven tickets, numbered as shown

    [1] [2] [3] [4] [5] [6] [7] .

    Four tickets are drawn at random, without replacement, from the box. Find the chance that the three tickets left in the box are 5, 6, and 7.

    (That's the same as drawing the 1, 2, 3, and 4 in the four draws.)

    (A) 1/35 (B) 1/25 (C) 1/10 (D) 1/2 (E) 34/35

12. A die is rolled twice. Find the chance that the [•] comes up on exactly one roll.

    (A) 5/36 (B) 1/6 (C) 5/18 (D) 19/36 (E) 5/6

13. A die is rolled 10 times. What is the chance of getting exactly four fives?

    (A) 3.1% (B) 5.43% (C) 20.5% (D) 40% (E) 67%

14. A fair die is rolled 660 times. Estimate the chance of getting exactly 110 threes.

    (A) 2% (B) 4% (C) 8% (D) 12% (E) 16 2/3%

15. One hundred draws are going to be made at random with replacement from the box

| 4 | 7 | 8 | 11 |. The SD of the box is 2.5.

Find the chance of getting a sum of draws greater than 800.

(A) 2% (B) 5% (C) 16% (D) 21% (E) 34 1/2%

16. A simple random sample of 4,400 persons is taken to estimate the percentage of Democrats among the 2,500,000 eligible voters in a large city. It turns out that 1727 people in the sample are Democrats.

Find a 95%-confidence interval for the percentage of Democrats among all 2,500,000 eligible voters.

(A) 37.04% to 41.46% (B) 37.475% to 41.025% (C) 37.78% to 40.72%
(D) 38.07% to 40.43% (E) 38.17% to 40.33%

17. The tickets in a box average 50, with an SD of 8. Eighty-one draws will be made at random with replacement from this box.

Estimate the chance that the average of the draws will be in the range 48 to 52.

(A) 3.99% (B) 19.74% (C) 27.37% (D) 38.29% (E) 97.56%

18. The speed of light is measured 100 times by a new procedure. The 100 measurements are recorded, and show no trend or pattern. The investigators work out the average and SD of the 100 numbers; the average is 299,793.7 kilometers per second and the SD is 24 kilometers per second. (You may assume the Gauss model, with no bias.)

Only one of these five statements is false. Which one?

(A) The average of all 100 measurements is off the speed of light by 2.4 or so.

(B) Each measurement is off 299,793.7 by 24 or so.

(C) Although we do not know it, we would estimate the standard deviation of the error box to be 24, based on the observed data.

(D) Although we do not know it, we would estimate the standard error for the average of the draws to be 2.4, based on the observed data and the sample size.

(E) A 95%-confidence interval for the average of the *100 measurements* is $299{,}793.7 \pm 4.8$.

19. A die is rolled 6480 times, resulting in 1100 [⚀]'s.

Does the result indicate that the die is fair, or that it gets too many [⚀]'s?

(Use a statistical test to decide, and state the value of P and your conclusion.)

(A) P = 1%, too many [⚀]'s (B) P = 4%, too many [⚀]s (C) P = 26%, fair (D) P = 31%, fair (E) P = 52%, fair

20. Each time that the Daily Number® is drawn, its first digit is a number from 0 to 9, chosen at random. To decide if all ten possibilities for the first digit are equally likely, the actual numbers from the 250 drawings from August 29, 2010, to December 31, 2010 were tabulated. The results were as follows:
(0) - 31, (1) - 18, (2) - 25, (3) - 33, (4) - 27, (5) - 29, (6) - 20, (7) - 27, (8) - 17, (9) - 23.

Is it reasonable to conclude from the above data that the random-number generator being tested is fair?

Use a statistical test. Decide on the null and alternate hypothesis, and then find the value of the z-statistic generated from the results.

What is the value of P, and what is the conclusion of the test?.

(A) $P < 1$, not fair (B) $P \approx 4.5\%$, fair (C) $P = 30\%$, fair (D) $P \approx 70\%$, fair (E) $P = 98\%$, fair