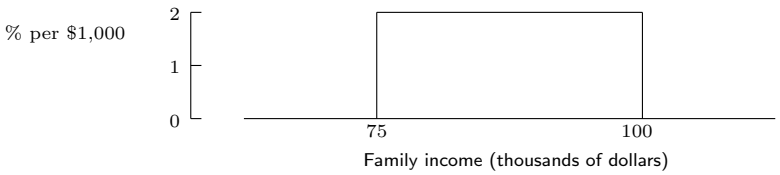
Sample of Final Exam Problems

Math 125: Spring 2025

Each problem is multiple choice. 4 points for a correct response, no points deducted for a wrong answer

(The actual final will have 21 somewhat similar questions, each with exactly 5 choices for the correct 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 \$75,000 and \$90,000 a year?



(A) 15% (B) 25% (C) 30% (D) 50% (E) 60%

2. Find the SD of the list 4, 11, 13, 13, 14, 17.

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

3. Among first-year students at a certain university, scores on the Verbal SAT follow the normal curve; the average is always around 500, and the SD is about 100.

One year, there were about 1,000 students with scores in the range 300–700 on the Verbal SAT. About _____ of them had scores in the range 400 to 600.

(A) 439 (B) 500 (C) 561 (D) 715 (E) 908

4. Among freshmen at a certain university, scores on the Math SAT followed the normal curve, with an average of 500 and an SD of 100.

A student who scored 315 on the Math SAT was at what percentile of the score distribution.

(A) The 1st (B) The 2nd (C) The 3rd (D) The 12th (E) The 99th

5.

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

6. Suppose that the correlation between weight (in pounds) and years of schooling completed is about -0.10.

Only one of these 5 statements is true. Which one?

(A) Heavier persons tend to be more educated.

(B) Persons with more education tend to weigh less.

(C) The correlation between years of schooling completed and weight (in pounds) is about $+0.10$.

(D) The correlation between weight (in kilograms) and years of schooling completed will not be about -0.10.

(E) If you eat and put on 25 pounds, you will become less educated.

7. For the first-year students at a certain university, the correlation between SAT scores and first-year GPA was 0.60. The scatter diagram is football-shaped. Predict the percentile rank on the first-year GPA for a student whose percentile rank on the SAT was 90%.

   (A) 58% (B) 64% (C) 79% (D) 84% (E) 90%

8. For the first year students at a certain university, the average GPA was 2.6 and the SD was 0.6, and the GPAs followed the normal curve.

   A student at the 84th percentile of GPAs had a GPA of about _____.

   (A) 2.75 (B) 2.9 (C) 3.0 (D) 3.2 (E) 3.44

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

   average midterm score ≈ 50, SD ≈ 25
   average final score ≈ 55, SD ≈ 15, $r \approx 0.60$

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

   About 68% of the time, the predictions will be right to within _____ points.

   (A) 6 (B) 9 (C) 12 (D) 15 (E) 25

10. A fair die is rolled 20 times. What is the chance that you never get the side with four spots. Find a numeric answer rounded to the nearest 1/10 percent (nearest 0.1%).

    (A) 1.3% (B) 2.6% (C) 40.2% (D) 48.2% (E) 97.4%

For Problems 11 and 12:

A champion dart player has a 23% chance of hitting the bull's-eye. he throws four darts, randomly and independently.

11. The chance that at least one of the four throws results in a bull's-eye is around:

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

12. The chance that exactly one of the four throws results in a bull's-eye is around:

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

13. Three cards are drawn at random without replacement from a standard deck of cards. (A standard deck has 26 red cards among the 52 cards.)

    What is the exact chance that all three of the cards drawn are red?

    (A) $1/17 \approx 6\%$ (B) $2/17 \approx 12\%$ (C) $1/8 = 12.5\%$ (D) $25/102 = 24.5\%$ (E) $15/17 = 88\%$

14. A box contains five tickets, numbered as shown

1	2	3	4	5

    .

    Three tickets are drawn at random, without replacement, from the box. Find the chance that the two tickets left in the box are numbered 4 and 5.

    (That is the same as asking: Find the chance that the three tickets drawn are the 1, 2, and 3—in any order.)

    (A) $1/10 = 10\%$ (B) $4/25 = 16\%$ (C) $2/5 = 40\%$ (D) $3/5 = 60\%$ (E) $27/125 = 21.6\%$

15. Two draws are made at random with replacement from a deck of cards (with 13 hearts among the 52 cards). Find the chance that a heart is chosen on exactly one draw.

    (A) $3/16 \approx 19\%$ (B) $1/4 = 25\%$ (C) $3/8 = 37.5\%$ (D) $1/2 = 50\%$ (E) $3/4 = 75\%$

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

    (A) 1.84% (B) 3.01% (C) 3.68% (D) 6% (E) 52%

17. A box has seven tickets, numbered 3 through 9. The SD of the box is 2. Fifty draws are going to be made at random with replacement from the box.

    The chance that the sum of the draws will be greater than 327 is about:

    (Ignore the $\pm 1/2$ continuity correction.)

    (A) 2.87% (B) 17% (C) 29% (D) 40% (E) 100.0%

18. 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%

19. 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%

20. 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%

21. Taking the average of 225 measurements would divide the likely size of the chance error by a factor of _____

    (A) 5 (B) 10 (C) 15 (D) 25 (E) 225

22. Twenty-five measurements are made on the speed of light. These average out to 300,007 and the SD is 10, the units being kilometers per second. (You may assume the Gauss model, with no bias.)

    Only one of the following five statements is false. Which one?

    (A) The speed of light is estimated as 300,007.

    (B) The above estimate is likely to be off by 2 or so.

    (C) Each measurement is off 300,007 by 10 or so.

    (D) If a 26th measurement were made, it would by off the exact value for the speed of light by 2 or so.

    (E) A 95%-confidence interval for the speed of light is $300{,}007 \pm 4$.

23. A die is rolled 1620 times, and it landed on the side with three spots 283 times.

Does this die appear to be fair? Or does it get too many threes?
(You must decide which test applies, show all calculations, and state the decision.)

State the value of P and your conclusion.

(A) 1%, unfair (B) 7%, fair (C) 20%, fair (D) 26%, fair (E) 40%, fair

24. One hundred draws are made at random with replacement from a box. The average of the draws is 22.7, and the SD is 10. Someone claims that the average of the box equals 20. Is this plausible?

Find P and decide whether the average of the box equals 20 or is more than 20.

(A) $P = 0.345\%$, more than 20 (B) $P = 1\%$, equals 20 (C) $P = 2.7\%$, more than 20
(D) $P = 40\%$, equals 20 (E) $P = 80\%$, equals 20

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