I   Multiple Choice

1.   In a certain game the odds in favor of winning are 13 to 2. The probability of
      winning is
      (A) $\frac{11}{13}$ (B) $\frac{13}{2}$ (C) $\frac{2}{13}$ (D) $\frac{2}{15}$ (E) $\frac{13}{15}$

2.   In the game of American roulette if a bet is placed on red the probability of winning
      is $\frac{18}{38}$. What are the odds for this bet?
      (A) 18 to 20   (B) 18 to 36   (C) 16 to 20
      (D) 20 to 38   (E) 16 to 18

3.   It cost you $3 to play a game in which you can win $4. If your probability of
      winning is 0.6 what will be your expected win or loss per game over a long period of
      time?
      (A) win $1.80   (B) lose $1.20   (C) win $1.20
      (D) lose $1.80   (E) break even

4.   Suppose that E and F are two mutually exclusive events such that P(E)
      = 0.3 and P(F) = 0.5. Then P(E or F) =
      (A) 0.85   (B) 0.15   (C) 0.2   (D) 0   (E) 0.8

5.   For the events of problem 5 the probability P(E and F) =
      (A) 0.8   (B) 0.15   (C) 0.85   (D) 0
      (E) can't be determined from data given

6. Suppose that G and H are independent events such that P(G) = 0.4 and
   P(H) = 0.7. Then P(G and F) =
   (A) 0.28   (B) 1 (C) 0.3   (D) 0   (E) 0.9

7. For the events G and H of problem 7 the value of P(G or H) is

   (A) 0.3   (B) 1.1   (C) 0.28   (D) 0   (E) 0.82

8. A small country has population 21137 and wants its house of representatives   to
   have 71 seats. The number of people (correct to two decimal places) for each seat
   (district) will be
   (A) 276.22   (B) 138.35 (C) 251.02
   (D) 297.70   (E) 202.11

9. A state in the country of problem 8 has population of 8512. What is the exact
   apportionment (# of seats 2) (correct to two decimal places) for this state?
   (A) 27.98   (B) 30.12   (C) 28.59
   (D) 119.89   (E) 112.76

10. A normal distribution has μ = 18 and σ = 2.5. The 95% confidence interval
    consist of numbers between

    (A) 15.5 and 20.5   (B) 13 and 23   (C) 18 and 20.5

    (D) 10.5 and 25.5   (E) 16.33 and 19.68

11. The first quartile for the distribution of problem 10 is (correct to 2 decimal places)

(A) 16.33   (B) 16.75   (C) 18.67

(D) 19.91   (E) 15.89

12. For the distribution of problem 10 the probability of a value larger than 25.5 is

(A) 0.3%   (B) 0.15%   (C) 99.7%

(D) 2.5%   (E) 95%

13. A simple random poll of 1500 people was taken asking if they approved of the way the government handled a recent crisis. The result was that 47% said "yes" ($\hat{p}$ = 47%). The standard deviation $\hat{\sigma}_{\hat{p}}$ for the sampling distribution for this poll (correct to two decimal places) is

(A) 2.12%   (B) 1.55%   (C) 1.29%

(D) 1.41%   (E) 2.03%

14. The margin of error at the 95% confidence level for the poll of problem 13 is

(A) ± 3.10%   (B) ± 2.58%   (C) ± 4.24%

(D) ± 2.82%   (E) ± 4.06%

15. If the sample size of the poll of problem 13 were increased to 3000 people the new value of $\hat{\sigma}_{\hat{p}}$ would be (correct to two decimal places).

(A) 1.50%   (B) 1.10%   (C) 0.91%

(D) 1.00%   (E) 1.44%

Given the numbers

    17, 0, 3.5, 4.3, 4, 1.8, 0.4, 5.7

answer the following questions:

16. The median is

    (A) 4   (B) 4.25   (C) 3.75   (D) 1.70   (E) 4.5

17. The first quartile is

    (A) 4   (B) 1.75   (C) 3.5   (D) 1.1   (E) 0

18. The mean is (correct to two decimal places).

    (A) 5.20   (B) 4.15   (C) 4.59   (D) 4.91   (E) 2.13

II   Partial Credit

19.   Draw a box and whisker plot for the above set of numbers

20.   Briefly describe the "Alabama Paradox" in apportionment.

21.   Briefly describe the "population Paradox" in apportionment.

22.   State an apportionment method for which the paradoxes of problems 20
       and 21 cannot occur.

23.   Briefly describe the "Condorcet paradox" in voting.

24.   Give an example of a sampling method which is almost certainly biased.

25. Describe a double blind experiment and give a reason why such a procedure might be better than an observational sampling method.

26.

(a) In the table above enter the initial quotas obtained by the Hamilton and Jefferson (H and J) methods and by the Webster (W) method for state A.

(b) Calculate the critical divisors for the Jefferson method and for the Webster method and enter them in the above table for state A.

(c) Use these results to obtain the final apportionment for the Hamilton, Jefferson and Webster methods for all three states.

27.

Use the table above to find the winner if the voting method is the

(a) plurality method

(b) Borda count method

28.

Use the table above to find the winner if the voting method is the

(a) Hare method

(b) sequential pairwise method with agenda ABC

Math 107

Final Exam   Name_____

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1. [A]   [B]   [C]   [D]   [E] 10. [A]   [B]   [C]   [D]   [E]

2. [A]   [B]   [C]   [D]   [E] 11. [A]   [B]   [C]   [D]   [E]

3. [A]   [B]   [C]   [D]   [E] 12. [A]   [B]   [C]   [D]   [E]

4. [A]   [B]   [C]   [D]   [E] 13. [A]   [B]   [C]   [D]   [E]

5. [A]   [B]   [C]   [D]   [E] 14. [A]   [B]   [C]   [D]   [E]

6. [A]   [B]   [C]   [D]   [E] 15. [A]   [B]   [C]   [D]   [E]

7. [A]   [B]   [C]   [D]   [E] 16. [A]   [B]   [C]   [D]   [E]

8. [A]   [B]   [C]   [D]   [E] 17. [A]   [B]   [C]   [D]   [E]

9. [A]   [B]   [C]   [D]   [E] 18. [A]   [B]   [C]   [D]   [E]

Multiple Choice   _____

Partial Credit   _____

Total   _____

On my honor, I have neither given nor received unauthorized aid on this exam.

Signature_____

Math 107

Final   Name_____

                                                        Print Please

May. 08, 1997   Student # _____

There are seven pages of questions. Each multiple choice question is
worth ?? points. The answer sheet is the seventh page. Mark Each of
your choices with an X. If you change your mind black out the old
answer and place an X in your new choice. Questions with more than one
X on the answer sheet will receive zero credit. Values of multiple choice
questions are as indicated in Exam. Show work on Partial Credit
questions, answer alone worth 1 point!!

This test is subject to the honor credit.
On my honor, I have neither given nor received unauthorized aid on this exam.

Error!

$\hat{\sigma}_{\hat{p}}$