"On my honor, as an Aggie, I have neither given nor received unauthorized aid on this academic work."

________________________________
Signature of student

Academic Integrity Task Force, 2004

My signature in this blank allows my instructor to pass back my graded exam in class or allows me to pick up my graded exam in class on the day the exams are returned. If I do not sign the blank or if I am absent from class on the day the exams are returned, I know I must show my Texas A&M student ID during my instructor’s office hours to pick up my exam.

Signature of student ____________________________________________

Multiple Choice: Clearly circle your answer choices. There is NO partial credit on the multiple choice questions.

Work Out: Write all solutions in the space provided, as full credit will not be given without complete, correct accompanying work, even if the final answer is correct. Fully simplify all your answers, and give exact answers unless otherwise stated. State any special features or programs you use on your calculator. Remember your units! Make sure that you indicate your answer clearly by circling your response.

All probabilities should be exact fractions. All other answers should also be exact, if not otherwise specified.

Clear your calculator BEFORE and AFTER your exam. MEM (2nd +), Reset, ALL, Reset
To turn on the correlation coefficient: Catalog (2nd 0), DiagnosticOn, Enter, Enter

There is no truth to the allegation that statisticians are mean. They are just your standard normal deviates. - Bruce White
1. Complete the probability tree and then compute the probabilities below as exact fractions in lowest terms.

![Probability Tree]

a. (3 pts) \( P(B \cap E) = \)

b. (4 pts) \( P(C \cup F) = \)

c. (2 pts) \( P(F^c | C) = \)

d. (4 pts) \( P(A | F) = \)

**BONUS** (5 pts): Find the value of \( z \), correct to 3 decimal places, corresponding to \( P(-z < Z < z) = 0.648 \).
2. (6 pts) A survey of 200 people asked if they were a skateboarder (S) or a cyclist (C), and the results are given in the Venn diagram below. Find the exact probability, as a \textit{fraction in lowest terms}, that a skateboarder selected at random is also a cyclist. Before computing the probability, use symbols to state what probability you are finding.

![Venn diagram with numbers: 30 cycling, 50 skateboarding, 40 cycling and skateboarding, 80 total.] 

3. In a lottery 2000 tickets are sold for $12 each. A grand prize of $8000 and 2 runner-up prizes of $4000 are to be awarded.
   a. (8 pts) Construct a probability distribution of the random variable $X$, which represents the NET winnings of a person who buys one lottery ticket. Give all probabilities as exact fractions.

   b. (4 pts) What are the expected NET winnings of a person who buys one ticket?
   Circle the correct answer.
   
   i. $3988.00
   ii. Loss of $5.99
   iii. $3996.00
   iv. Loss of $3.98
   v. Loss of $4.00
   vi. None of these

4. (6 pts) Your music collection consists of 3 jazz CDs, 4 classical CDs, and 5 western CDs. If you randomly grab 4 of these CDs, what is the exact probability, as a \textit{fraction in lowest terms}, that you will get exactly 2 jazz or exactly 2 classical CDs?
5. (5 pts) Find the probability of \( P(Z \geq 0.4) \), correct to 4 decimal places.
   
   a. None of these  
   b. 0.3446  
   c. 0.2743  
   d. 0.1156  
   e. 0.2533

6. (6 pts) There are three levels of ballroom dancers: bronze \((B)\), silver \((S)\), and gold \((G)\). There are two main categories of ballroom dance: American Smooth \((AS)\) and American Rhythm \((AR)\). Fifty percent of ballroom dancers are bronze level, 40% are silver level, and the rest are gold level. Of the bronze level dancers, 60% prefer American Smooth and 40% prefer American Rhythm. Of the silver level dancers, 50% prefer American Smooth and 50% prefer American Rhythm. Of the gold level dancers, 75% prefer American Smooth and 25% prefer American Rhythm. Draw a probability tree diagram, using the given labels of \(B, S, G, AS,\) and \(AR\).

7. (4 pts) When bananas are harvested, 86% of the bananas are good. Use the appropriate normal distribution to approximate the probability, correct to 4 decimal places, that out of 80 dozen bananas more than 800 are good.
   
   a. 0.9902  
   b. 0.9890  
   c. None of these  
   d. 0.9924  
   e. 0.9914

8. (5 pts) The random variable \(X\) represents the number of hairs on the head of each student registered in this Math 141 class. This random variable \(X\) is classified as which of the following?
   
   a. Continuous  
   b. Infinite Discrete  
   c. Finite Discrete  
   d. Continuous Discrete  
   e. None of these
9. (5 pts) You are given that $P(E) = 0.2$, $P(F) = 0.7$, and $P(E \cup F) = 0.76$.

Circle the correct multiple-choice answer (choices are a – g) regarding the truth of the statements I, II, and III.

I. E and F are mutually exclusive.
II. E and F are independent.
III. $P(E^C \cup F^C) = 0.24$

a. Only I is true  b. Only II is true  c. Only III is true
d. Only I and II are true  e. Only I and III are true  f. Only II and III are true
g. I, II, and III are true

10. (4 pts) The probability that Mickey Mouse will go to class on the day after an exam is 0.89. What are the odds that Mickey Mouse will not go to class after an exam?

11. (5 pts) In Kacie’s pantry, she has 5 cans of pumpkin, 8 cans of beans, and 6 cans of tuna. If Kacie randomly selects 4 cans from her pantry, what is the probability that she selects exactly 2 cans of beans and at least 1 can of tuna?

a. $\frac{49}{323}$
b. None of these
c. $\frac{70}{723}$
d. $\frac{105}{323}$
e. $\frac{1}{114}$

12. (5 pts) A survey finds that, on average, 92% of college students are up to date on their vaccinations. Determine the probability, to 4 decimal places, that out of 48,000 unrelated students at least 44,080 and less than or equal to 46000 students are up to date on their vaccinations.

a. 0.9974  b. 0.9119  c. 0.9108
d. None of these  e. 0.9092
13. A random variable $X$ can only assume values 1, 2, 3, 4, and 5. Use the histogram of the probability distribution of $X$ to answer the following questions.

![Histogram of $X$](image)

a. (3 pts) The rectangle with base centered on the value of 4 is missing. Draw the missing rectangle.

b. (3 pts) What is the exact mean of $X$? _________________

c. (2 pts) What is the exact median of $X$? _________________

d. (2 pts) What is the mode of $X$? _________________

e. (2 pts) What is the exact range of $X$? _________________

f. (2 pts) What is the standard deviation of $X$ to 2 decimal places? _________________

g. (2 pts) Shade the portion of the histogram which represents $P(X < 3)$.

14. The temperature of an electric arc is normally distributed with a mean of 35,000 degrees F and a standard deviation of 5000 degrees F.

a. (5 pts) Find the probability, correct to 4 decimal places, that the temperature of a randomly selected electrical arc is greater than 36,000 and less than or equal to 42,000 degrees F.

b. (3 pts) What temperature, to the nearest integer, corresponds to the 90th percentile?