"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 are 3 types of people in the world: those that can count and those that cannot.
1. (8 pts) The letters in the graph indicate separate regions of the plane. Which letter(s) in the graph represent the region(s) in the solution set for the system below?

\[
\begin{align*}
3x - 5y & \geq 15 \\
y & \geq -x \\
2x + 7y & \leq 28
\end{align*}
\]

Answer: ____________________________________

The solution region is (circle one): BOUNDED or NOT BOUNDED

2. (6 pts) Let \( S = \{e_1, e_2, e_3, e_4, e_5, e_6\} \) be a uniform sample space with events \( E = \{e_2, e_4, e_6\} \), \( F = \{e_3\} \), and \( G = \{e_1, e_6\} \). Give your probabilities as exact fractions in lowest terms.

   a. \( P(E \cap F) = \)
   
   b. \( P(E^C \cup G) = \)

3. (12 pts) Set up but do not solve the linear programming problem; clearly define your variables.

Jennifer makes necklaces either out of stone beads or out of glass beads. One packet of stone beads costs $10 and one packet of glass beads costs $4. The stone bead necklaces can be sold for $36 each and the glass bead necklaces can be sold for $12 each. Jennifer has $300 available to order beads, and Jennifer wants to make at least 3 times as many glass bead necklaces as stone bead necklaces. How many bead packets of each type should Jennifer order to maximize her revenue \( R \), if each packet makes one bead necklace?
4. Sherry’s students were surveyed to determine which newspaper games: Sudoku (S), Jumble (J), and Crossword Puzzles (P), they played. The following data was collected from 150 students.

- 30 played only Sudoku
- 6 played Jumble and Crossword Puzzles, but not Sudoku
- 64 played Jumble
- 32 played none of these three
- 14 played Crossword Puzzles and Jumble
- 68 played Jumble or Crossword Puzzles, but not Sudoku
- 22 played only Crossword Puzzles

a. (8 pts) Determine how many students are in each region of the Venn diagram.

\[ a = \quad \quad \quad \quad \quad e = \quad \quad \quad \quad \quad \]
\[ b = \quad \quad \quad \quad \quad f = \quad \quad \quad \quad \quad \]
\[ c = \quad \quad \quad \quad \quad g = \quad \quad \quad \quad \quad \]
\[ d = \quad \quad \quad \quad \quad h = \quad \quad \quad \quad \quad \]

b. (4 pts) Shade the region of the given Venn diagram that represents \( (S \cap P^C) \cup J \).

5. (5 pts) How many different 7-digit numbers are there if the 7-digit number cannot start with 0 and the number must be even?

a. None of these
b. 4,500,000
c. 2,657,205
d. 181,440
e. 4,782,969
6. (5 pts) An experiment consists of flipping a fair coin and observing if it lands heads (H) or tails (T), and then selecting a card from the ones shown. What is an appropriate sample space for this experiment?

![Sample space options]

a. circle, square, blank, H, T  
b. (T, circle), (H, circle), (T, square), (H, square), (T, blank), (H, blank)  
c. None of these  
d. \{(T, circle), (H, circle), (T, square), (H, square), (T, blank), (H, blank)\}  
e. \{T, H, circle, square, blank\}

7. A book club sells two kits: the standard kit and the deluxe kit. The contents and profit of each listed in the table below.

<table>
<thead>
<tr>
<th></th>
<th>(x = \text{number of standard kits})</th>
<th>(y = \text{number of deluxe kits})</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of paperbacks</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Number of hardback books</td>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td>Profit</td>
<td>$4.50</td>
<td>$8.00</td>
</tr>
</tbody>
</table>

Each day the book club has 164 paperback books available and 216 hard back books available. Since the book club can handle no more than 64 standard kits and 62 deluxe kits each day, all the corner points of the bounded feasible solution set are \((0, 0)\), \((0, 62)\), \((30, 62)\), \((60, 52)\), \((64, 50)\), and \((64, 0)\).

a. (5 pts) How many of each type of book kit should the book club make and sell each day to maximize their profits? Circle the correct answer.

i. 0 standard kits and 0 deluxe kits  
ii. 0 standard kits and 62 deluxe kits  
iii. 30 standard kits and 62 deluxe kits  
iv. 60 standard kits and 52 deluxe kits  
v. 64 standard kits and 50 deluxe kits  
vi. 64 standard kits and 0 deluxe kits

b. (4 pts) What is the maximum profit? ______________________

c. (4 pts) What and how many of any resource is leftover?
8. (6 pts) *Mauruuru* means “thank you” in Tahitian. How many distinguishable arrangements are there in the word *mauruuru*?

9. (6 pts) An experiment consists of rolling a pair of fair six-sided dice. What is the exact probability, as a fraction in lowest terms, exactly one 3 is rolled or the sum is at most 4?

10. TF (10 pts – 1 pt each) Clearly circle your answer. No work is necessary, and no partial credit will be given.

   \[ U = \{ x \mid x \text{ is a lower case letter in the English alphabet} \} \]
   \[ T = \{ x \mid x \text{ is a letter in the word } \text{telescopes}\} \]
   \[ S = \{ x \mid x \text{ is a letter in the word } \text{space}\} \]
   \[ A = \{a, p, e, s\} \]
   \[ P \subseteq U \]

   a. True or False: \( n(T^C) = 16 \)
   b. True or False: \( t \in (T \cap A) \)
   c. True or False: \( \emptyset \subseteq S \)
   d. True or False: \( T \cup (A \cap A^C) \subseteq T \)
   e. True or False: \( A \) has exactly 14 proper subsets.
   f. True or False: \( T \) and \( S \) are disjoint sets.
   g. True or False: \( a, b, c \in U \)
   h. True or False: \( \{l\} \in (T \cup S) \)
   i. True or False: \( S \cup A = S \)
   j. True or False: \( n(S \cap P) = 5 + n(P) - n(S \cup P) \)
11. (6 pts) In how many ways can a chair, secretary, treasurer, 2 public-relations, and 3 additional people be chosen from a group of 20 people?

12. (6 pts) An experiment has a sample space of \( S = \{s_1, s_2, s_3, s_4, s_5, s_6, s_7\} \) with the probability distribution given.

<table>
<thead>
<tr>
<th>Outcome</th>
<th>Probability</th>
</tr>
</thead>
<tbody>
<tr>
<td>( s_1 )</td>
<td>0.2</td>
</tr>
<tr>
<td>( s_2 )</td>
<td>0.05</td>
</tr>
<tr>
<td>( s_3 )</td>
<td>( p_3 )</td>
</tr>
<tr>
<td>( s_4 )</td>
<td>0.13</td>
</tr>
<tr>
<td>( s_5 )</td>
<td>( p_5 )</td>
</tr>
<tr>
<td>( s_6 )</td>
<td>0.24</td>
</tr>
<tr>
<td>( s_7 )</td>
<td>0.13</td>
</tr>
</tbody>
</table>

If \( E = \{s_1, s_3, s_5\} \), \( F = \{s_5, s_7\} \), \( P(E) = 0.45 \), and \( P(F) = 0.27 \), exactly find the missing probabilities as exact decimals or as exact fractions in lowest terms.

\( p_3 = \) __________

\( p_5 = \) __________

13. (5 pts) There are 9 green beach balls and 8 pink beach balls. If you pick 6 beach balls at random, in how many ways can you get at least 1 pink beach ball?

**5-point Bonus:** How many ways can 5 \( P \)'s and 8 \( Q \)'s be placed in a row if the \( P \)'s are not next to each other?