Math 166 Exam 1, Form A Fall 2008

"An Aggie does not lie, cheat, or steal or tolerate those who do"

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

Printed name:_____

Signature:_____

Today my seat is: Row:_____ Seat number:_____

Usually my seat is: Row:_____ Seat number:_____

- You may use your calculators, but they must be cleared of all programs before beginning this exam.
- You may not use your book or notes on this exam.
- You may not collaborate with your neighbors on this exam.
- There is no partial credit on the multiple choice or true/false questions.
- You must show all appropriate work to receive credit (especially partial credit) on the work-out problems.
- The instructor will provide additional scratch paper if needed.
- Reach each question carefully.
- SCHOLASTIC DISHONESTY WILL NOT BE TOLERATED.

Problems 1-8 are worth 4 points each. Mark your answers on your exam as well as on your scantron.

1. Which of these are statements?
   p: Mount Everest is the world's tallest mountain.
   q: Go to the store.
   r: Texas A&M University is not located in College Station, TX.

   a) Only p b) Only q c) Only q and r d) Only p and q
   e) Only p and r

2. Given p, q, r from problem 1, $p \veebar \sim r$ is best described by the sentence:

   a) Mount Everest is the world's tallest mountain, or Texas A&M University is located in College Station, TX.

   b) Mount Everest is the world's tallest mountain, or Texas A&M University is not located in College Station, TX.

   c) Either Mount Everest is the world's tallest mountain, or Texas A&M University is located in College Station, TX but not both.

   d) Either Mount Everest is the world's tallest mountain, or Texas A&M University is not located in College Station, TX, but not both.

   e) Mount Everest is the world's tallest mountain, and Texas A&M University is not located in College Station, TX.

3. If the odds in favor of an event A are 4:3, what is the probability that A does not occur?

   a) $\frac{1}{7}$ b) $\frac{3}{7}$ c) $\frac{3}{4}$ d) $\frac{4}{7}$ e) none of these

4. If $n(A \cup B) = 70$, $n(A) = 40$, $n(A \cap B) = 30$, what is $n(B)$?

   a) 60 b) 30 c) 10 d) 40 e) none of these

5. If the probability of an event B is $\frac{2}{5}$ what are the odds in favor of B?

   a) 2:5 b) 5:7 c) 3:2 d) 7:5 e) none of these

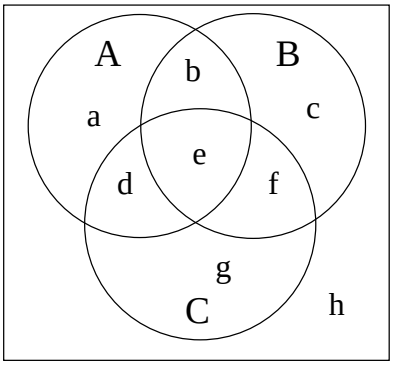
6. Given a sample space $S = \{s_1, s_2, s_3, s_4, s_5, s_6\}$, event $A = \{s_1, s_2, s_4\}$, and event $B = \{s_3, s_5, s_6\}$, and the following incomplete probability distribution:

Outcome	s_1	s_2	s_3	s_4	s_5	s_6
Probability	0.1		0.15	0.2		0.1

   If $P(A) = 0.43$, what is $P(B)$?

   a) 0.13 b) 0.57 c) 0.35 d) 0.32
   e) there is not enough information to solve this problem

For questions 7 and 8, use the following Venn diagram of three sets, A, B, C, with regions marked with lowercase letters a-h:



For example in the above diagram set A is regions a, b, d, e.

7. Which regions in the Venn diagram are in the set $(A \cap B)^c \cap C$?

   a) d, f, g b) d, f c) d, f, g, h d) d, e, f, g e) none of these

8. Which set contains only regions a, d, g

   a) $A \cup C$ b) $B^c \cap (A \cap C)$ c) $B^c \cup (A \cup C)$ d) $B^c \cap (A \cup C)$
   e) none of these

On the back of your scantron mark A for TRUE and B for FALSE. Mark your answers on your test as well as on your scantron.

The True/False questions are worth 2 points each.

51. a) TRUE b) FALSE $A \subseteq A$.

52. a) TRUE b) FALSE If A and B are sets then $n(A) \leq n(A \cup B)$.

53. a) TRUE b) FALSE If A and B are mutually exclusive events, then $P(A \cap B) = 0$.

54. a) TRUE b) FALSE If $P(A) = 0.35$, then $P(A^c) = 0.75$.

55. a) TRUE b) FALSE If A and B are independent events then $P(A|B) = P(B)$.

56. a) TRUE b) FALSE If A is a set, then $\emptyset \in A$.

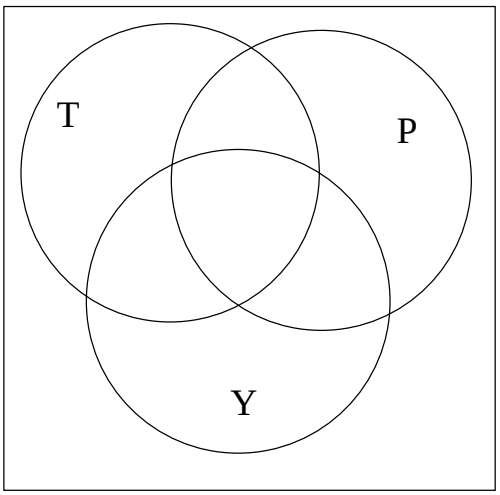
57. a) TRUE b) FALSE If A and B are mutually exclusive events, then $P[(A \cap B)^c] = 0$.

58. a) TRUE b) FALSE If $A = \{x \mid x \text{ is an odd number between 1 and 15}\}$ and $B = \{3, 5, 7, 17\}$ then $B \subseteq A$.

Show your work on the following problems.

1. At a weekend spa-resort, classes are offered in Tai Chi, Yoga, and Pilates. There are 50 total attendees, of which
   20 do Tai Chi,
   19 do Pilates,
   10 do Tai Chi and Yoga,
   3 do all three classes,
   5 do Tai Chi and Pilates,
   5 don't do any classes,
   and 7 do Pilates and Yoga.

   (8 points) Fill in all regions of the Venn diagram where T indicates Tai Chi, Y indicates Yoga and P indicates Pilates.



   (2 points) How many attendees do Yoga?

2. A bag of coins contains pennies, dimes and quarters. An experiment consists of removing 2 coins from the bag and observing the total monetary value.

   (4 points) What is the sample space of this experiment?

   (2 points) What is the event E that the amount observed is greater than 11 cents?

3. (8 points) Finish making a truth table for the statement $\sim p \vee (q \veebar r)$.

p	q	r	$\sim p$	
T	T	T		
T	T	F		
T	F	T		
T	F	F		
F	T	T		
F	T	F		
F	F	T		
F	F	F		

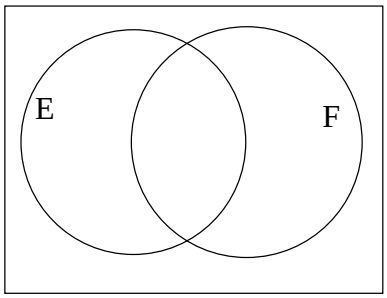
4. 4% of a population has meningitis. If a medical test for meningitis is performed on someone who has meningitis, there is a 97% chance that the test will be positive. If the person does not have meningitis, there is a 95% chance that the test will be negative.

   (4 points) Draw a tree diagram of this problem, clearly labeling each branch with its outcome and the probability of that outcome. You may want to use M for meningitis, and + for a positive test result.

   (4 points) What is the probability that someone has meningitis given a positive test result?

5. Of 100 students who take two exams, 91 pass the first exam and 87 pass the second exam. 5 didn't pass either exam. Let E be the set of students passing the first exam, and let F be the set of students passing the second exam.

   (4 points) Fill in the Venn Diagram below with information given in the problem and deduced from the given information.



   (4 points) Are the events E and F independent?

6. A bag contains 4 red pegs and 6 blue pegs. Two pegs are chosen in succession, without replacement, and their colors are observed.

   (6 points) Draw a tree diagram to represent this problem. Label the branches R for red and B for blue. Put probabilities on the branches.

   (2 points) What is the probability of drawing a blue peg on the second draw if a red peg was chosen first? Write your answer as a fraction in lowest terms.

   (4 points) What is the probability of drawing a blue peg on the second draw? Write your answer as a fraction in lowest terms.