

Psychology 317 Exam #1
January 17, 2006

Instructions

1. Use a pencil, not a pen
2. Put your name on each page where indicated, and in addition, put your section on this page.
3. Exams will be due at 9:20!
4. If you find yourself having difficulty with some problem, go on to the rest of the problems, and return to the troublemaker if you have time at the end of the exam.
5. Leave your answers as reduced fractions or decimals to three decimal places.
6. **CIRCLE ALL ANSWERS: You will lose credit if an answer is not circled!!**
7. Check to make sure that you have all questions (see grading below)
8. **SHOW ALL YOUR WORK: An answer that appears from nowhere will receive no credit!!**
9. Don't Panic!
10. Good luck!

INFORMATION AND DEFINITIONS

- a) A "fair die" is a die that has a $1/6$ probability of coming up each of the numbers 1-6.
- b) A "fair coin" is a coin that has a .5 probability of coming up heads.
- c) A standard deck has 4 suits (Clubs, Diamonds, Hearts, Spades) with 13 cards per suit (Ace, 2-10, Jack, Queen, King).

Grading

<u>Problem</u>	<u>Points</u>	<u>Grader</u>
1a-d	20	Ren
2a-f	35	Katie
3a-b	25	Vickie
4	10	Bailey
5	10	Greg
TOTAL	/100	

Name _____

Section _____

1. Suppose that a universal set, W , consists of all items sold at the University District Safeway store (Safeway is a supermarket selling mostly food). Describe in English examples of Sets A and B such that A and B satisfy the following requirements (5 points apiece)

a) Both mutually exclusive and mutually exhaustive

b) Mutually exclusive but not mutually exhaustive

c) Mutually exhaustive but not mutually exclusive

d) Neither mutually exclusive nor mutually exhaustive

2. Arnold's Fish World sells only fish (to eat). It sells fresh fish (F) which account for 75% of its fish and frozen fish (Z), which account for the rest. The seafood comes from four sources: Alaska (A), Ballard (B), Cascade Mountain lakes (C), and Denmark (D).

Of all Arnold's fish, 50% come from Alaska 30% come from Ballard, and 15% come from the Cascade Lakes.

It is known that 36% of the fresh fish are from Ballard, that 40% of the Alaska fish are frozen, and that the probability is 0.6 that a random Denmark fish is fresh.

a) Given this information, fill in the entries in the contingency table below (15 points).

	A	B	C	D	
F	$p(F \cap A) =$	$p(F \cap B) =$	$p(F \cap C) =$	$p(F \cap D) =$	$P(F) =$
Z	$p(Z \cap A) =$	$p(Z \cap B) =$	$p(Z \cap C) =$	$p(Z \cap D) =$	$P(Z) =$
	$p(A) =$	$p(B) =$	$p(C) =$	$p(D) =$	$p(S) =$

Based on your contingency table, answer the following (4 points apiece).

b) $p(F|B) =$

c) $p(D|F) =$

d) $p(B|(F \cup C)) =$

e) $p(Z|\bar{F}) =$

f) Consider only Alaska (A) versus non-Alaska (\bar{A}) and fresh (F) versus frozen (Z). Are these outcomes independent? Show why or why not.

3. Suppose that you simultaneously roll two fair dice, a red die and a green die. The red die is normal (with numbers 1-6) but the green die has "10" written on two of the faces and "13" written on the other four faces.

You are interested in the *sum* of the two numbers that show up on the two dice, and you wish to calculate the probability that the sum is 14. To do so, you define a sample space of 9 elementary events corresponding to the 9 possible sums, i.e.,

$$S = \{11, 12, 13, 14, 15, 16, 17, 18, 19\}$$

and thus $f(S) = 9$. Now to obtain the probability of getting a sum of 14, you note that there is one elementary event corresponding to getting a 14, i.e., $f(14) = 1$. Thus, to compute $p(14)$ you use the formula,

$$p(14) = f(14)/f(S) = 1/9 = 0.111$$

a) What is wrong with this reasoning; i.e., what assumption is violated? (15 points)

b) What is the actual probability of getting a 14? (10 points)

Name _____

Section _____

4. Suppose you throw a die (which may or may not be fair) N times and you get x 5s. How would you compute the *proportion* of 5s, $pr(5)$, that you get? Explain the relations among the following things: (a) the *probability* of getting a 5 on each throw, $p(5)$, (b) the proportion of 5s that you get out of the N throws, and (c) N , the number of throws that you make. (10 points)

5. In the game “Space Marauders II” there are aliens who can attack you. During each episode, the most dangerous aliens, the “Zombies” attack with a 10% probability, i.e., $p(Z) = 0.10$. If they attack, Zombies will kill you with a probability of 90%. If they don’t attack, you might still be killed by other aliens. Let the probability that you are killed during an episode be designated $p(K)$.

Compute the probability that you will be killed by a Zombie during an episode. **Show your work using conditional, unconditional, and joint probability notation. Incorporate in your work the equation relating conditional, unconditional, and joint probability, which, in its general form, is**

$$p(A|B) = p(A \cap B) / p(B)$$

(10 points: 4 points for getting the correct answer, and 6 points for correctly using conditional, unconditional, and joint probability notation to arrive at your answer).