

Name	
Purdue student ID (10 digits)	

- 1. The testing booklet contains 4 questions, which are all weighted evenly (i.e., each question is worth 1/4 of the midterm exam grade).
- 2. Permitted Texas Instruments calculators:

BA-35

BA II Plus*

BA II Plus Professional Edition*

TI-30XS MultiView*

TI-30Xa

TI-30XIIS*

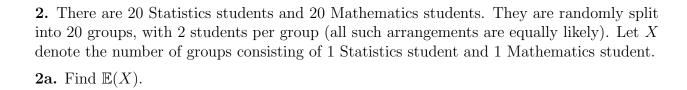
TI-30XIIB*

TI-30XB MultiView*

- 3. Circle your final answer in your booklet; otherwise, no credit may be given.
- 4. There is no penalty for guessing or partial work.
- 5. Show all your work in the exam booklet. If the majority of questions are answered correctly, but insufficient work is given, the exam could be considered for academic misconduct.
- 6. Extra sheets of paper are available from the proctor.

^{*}The memory of the calculator should be cleared at the start of the exam.

1. Suppose that there are two 6-sided dice in a hat. One die has 3 white sides and 3 black sides. The other die has 2 white sides and 4 black sides. Juanita reaches into the hat and randomly pulls out a die. She rolls the chosen die and "black" appears on top. Given this condition, what is the probability that the chosen die has 3 white sides and 3 black sides?



2b. Find Var(X).

3. Suppose Alice rolls a 4-sided dice until she gets her first occurrence of "1" and then she stops. Let X denote the number of rolls until (and including) that first occurrence of "1." Suppose Bob flips a fair coin until he gets his first occurrence of "heads" and then he stops. Let Y denote the number of flips until (and including) that first occurrence of "heads." Find $P(X \ge Y)$.

- 4. During the holiday rush, there are 300,000 shoppers in a certain city. Each of these shoppers is extremely likely to purchase candy. Their choices (whether or not to purchase candy) are made independently. Suppose that a person purchases candy with probability 99,999/100,000 and declines to purchase candy with probability 1/100,000. Let X be the number of people who decline to purchase candy.
- **4a.** Give an exact formula for the probability that $P(X \leq 4)$. You do *not* have to evaluate the formula on your calculator.

4b. Use a Poisson estimation for the probability above.

4c. Use your calculator to evaluate the Poisson expression that you gave in part 4b.