Probability
Midterm III
November 10, 2011

↑ Student name ↑

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The usual disclaimer: It is essential to write legibly and *show your work*. If your work is absent or illegible, and at the same time your answer is not perfectly correct, then no partial credit can be awarded. Completely correct answers which are given without justification may receive little or no credit.

During this exam, you are not permitted to use calculators, notes, or books, nor to collaborate with others.

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Problem	Score/4
1	
2	
3	
4	
5	
Total/20	

Problem 1. Santa Claus has 9 drums, 10 cars, and 11 baseball bats in his sled. 3 boys will get a drum and a car, 4 a drum and a bat, 5 a bat and a car, and 1 will get three presents.

(a) Assuming each gift will be given away to some boy, and no boy will get more than one of each type of gift – how many boys will receive presents?

(b) How many boys will just get a drum?

Problem 2. Suppose you play a game 5 times. Each time you play there are three equally likely possibilities: win \$1; lose \$1; or neither win nor lose. Find the probability that in the end you have the same amount of money as you started with.

Problem 3. Suppose X has density function $3x^2$ for $0 < x < 1$ and 0 otherwise. Find (a) the distribution function, (b) $P(1/3 < X < 2/3)$, and (c) the median (the number a such that $P(X < a) = 1/2$).

Problem 4.   A particular football team is known to run 50% of its plays to the left and 50% to the right. When the play goes to the right, the right tackle shifts his stance 90% of the time, but does so only 80% of the time when the play goes to the left.

Suppose right now, as the team sets up for the play, the right tackle *does* in fact shift his stance. What is the probability that the play will go to the right? *Determine whether the answer is more or less than* 3/5.

Problem 5. Suppose X has the density function from Problem 3. Find (a) $E(X)$, (b) $E(X^2)$, (c) var (X).