Stat 134, Fall 2008

HOMEWORK 5 (due Wed 10/1)

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Every time you find a distribution or a joint distribution:

First Step. Start with possible values, not probabilities. List all the possible values in a row or in a table. When you are listing values in a table, write down all possible values of the first variable and, separately, all possible values of the second, even if some of the pairs are impossible.

Second Step. Check to see if there are pairs which are impossible because of the way the variables are defined. Enter 0 for the probability in each of those cells.

Third Step. Fill in the probabilities in the other cells. This is the only step that requires probability calculations.

Last Step. Once you have filled in all the cells, check that the entries sum to 1.

1. 3.1.6.

2. Let N be a number drawn at random from the set $\{1, 2, 3, 4\}$, and let H be the number of heads in N tosses of a coin.

a) Make a joint distribution table for N and H. Your table should contain numerical values, not formulas.

b) Find the distribution of H. What is the most likely value of H?

c) Find E(H).

3. 3.1.14.

4. 3.2.14.

5. 3.rev.10. Prove your answers, don't just talk your way through them. Before you do part (a) it's a good idea to find the probability of a match at i with no restrictions at any other place. This will be useful for part (b).

After you've done part (b), do:

c) Repeat parts (a) and (b) in the case where the balls are assigned to the boxes as follows: Ball 1 goes into one of the n boxes at random; Ball 2 goes into one of the remaining n-1 boxes at random; and so on. These conditions imply that each box will contain exactly one ball and that all n! arrangements are equally likely. This fact about permutations will be useful for proving your answers.

6. Children at an elementary school are raising money for charity. The principal promises that each student who raises more than \$5 will get a popsicle. In the end the 120 students raise \$1.90 on average. The principal has a box of 4 dozen popsicles. Will that be enough for her to keep her promise, or will she need more? Or can't you say with the information given? Justify your answer – what fact about expectations is relevant here?