Stat 134: Section 7

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Problem 1

A fair coin is tossed three times. Let X be the number of heads on the first two tosses, Y be the number of heads on the last two tosses.

a. Make a table showing the joint distribution of X and Y.

b. Are X and Y independent?

c. Find the distribution of $X + Y$.

Ex 3.1.6 in Pitman's Probability

Problem 2

A box contains 8 tickets. Two are marked 1, two marked 2, two marked 3, and two marked 4. Tickets are drawn at random from the box without replacement until a number appears that has appeared before. Let X be the number of draws that are made. Make a table to display the probability distribution of X.

Ex 3.1.9 in Pitman's Probability

Problem 3

Blocks of Bernoulli trials. In $n + m$ independent Bernoulli(p) trials, let S_n be the number of successes in the first n trials, T_m the number of successes in the last m trials.

a. What is the distribution of S_n? Why?

b. What is the distribution of T_m? Why?

c. What is the distribution of $S_n + T_m$? Why?

d. Are S_n and T_m independent? Why?

Ex 3.1.10 in Pitman's Probability

Problem 4

Let X and Y be independent, each uniformly distributed on $\{1, 2, ..., n\}$. Find:

Hint: Symmetry might be useful.

a. $P(X = Y)$;

b. $P(X < Y)$;

c. $P(X > Y)$;

d. $P(\max(X, Y) = k)$ for $1 \le k \le n$;

Ex 3.1.15a-d in Pitman's Probability

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