STAT 2857A – Lecture 23 Examples and Exercises

Let's play a game!

Suppose that I have

1) a bag that contains 18 white marbles and 9 black marbles, and
2) a standard deck of cards.

You will choose 3 marbles from the bag without replacement. Let W be the number of white marbles. You will then draw $N = \max(W, 3 - W)$ cards from the deck without replacement. Let R be the number of red cards. You win the game (and a prize) if all N cards are the same colour – i.e., if $R = N$ or $R = 0$.

The joint probability mass function of W and R has the following values:

		r		
w	0	1	2	3
0	0.003	0.011	0.011	0.003
1	0.054	0.113	0.054	0.000
2	0.115	0.240	0.115	0.000
3	0.033	0.107	0.107	0.033

a) Show that the probability that $W = 2$ and $R = 1$ is .240?
b) Find a general expression for the joint probability mass function of W and R?
c) What are the mean and variance of R?
d) What is the probability that you win?
e) What is the conditional pdf of W given $R = 2$?
f) What is the mean of W given $R = 2$? Provide an interpretation for this value.
g) What is the variance of W given $R = 2$?
h) What are the covariance and correlation of W and R?