Probability and Statistics I

23. Statistics and their Distributions

Chapter 5 Summary Exercise

Exercise 23.1: Let's play a game!

I have

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

A selected student will

A) Choose 3 marbles from the bag without replacement. Let W be the number of white marbles.
B) Draw $N = \max(W, 3 - W)$ cards from the deck without replacement. Let R be the number of red cards.

The student wins the game (and a prize) if all N cards are the same colour ($R = 0$ or $R = N$).

Exercise 23.1 ctd

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

Exercise 23.1 ctd

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?