

Rolling Two Dice Random Variables Using R  
Stat 341 - Fall 2008

In some examples, the sample space of the experiment is small enough to easily use R to study the distribution of the random variables arising from the particular sample space. In this help file, we will look at R code for the sample space of rolling two dice. The sample space consists of 36 simple events, each having the same probability  $1/36$ . The following R code will set up the sample space S in a matrix with two columns (the outcomes on the two dice) and 36 rows (the 36 possible outcomes).

```
Stwodice<- scan()  
1 1 1 2 1 3 1 4 1 5 1 6  
2 1 2 2 2 3 2 4 2 5 2 6  
3 1 3 2 3 3 3 4 3 5 3 6  
4 1 4 2 4 3 4 4 4 5 4 6  
5 1 5 2 5 3 5 4 5 5 5 6  
6 1 6 2 6 3 6 4 6 5 6 6
```

```
Stwodice<- matrix(Stwodice, byrow = T, ncol = 2)
```

Applying the **sum** function or the **max** function to the rows of this matrix will produce the 36 sums and 36 maximum values corresponding to the 36 simple events in S.

```
sumtwodice<- apply(Stwodice, 1, sum)  
maxtwodice<- apply(Stwodice, 1, max)
```

We can then study the distribution of the two random variables using histograms and summary statistics. For example, to find the smallest and largest possible values of the sums, you can type

```
min(sumtwodice)  
max(sumtwodice)
```

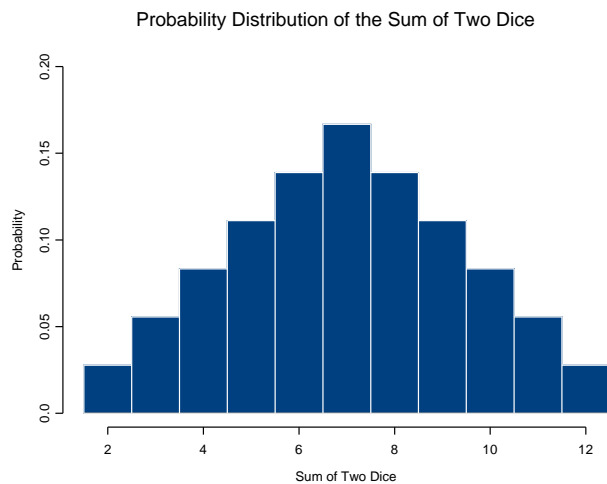
To find other summary statistics of the possible sums, like the mean, median, five number summary, and standard deviation, you can type

```
mean(sumtwodice) #mean  
sqrt(var(sumtwodice)) #std. dev.  
fivenum(sumtwodice) #five number summary
```

To get a picture of the distribution of the possible sums, you can make a probability histogram. For these values, you should set up the histogram so that the possible values are centered in the bars of the histogram. For example, for the sums, you should set up your histogram as

```
sumdicebreaks<- c(1:12) + 0.5  
hist(sumtwodice, breaks = sumdicebreaks, prob = T)
```

Here is a picture of the probability distribution of the sums.



Similar code in R will give you the probability histogram and summary statistics for the distribution of the largest or maximum values of the two dice.

```
min(maxtwodice) #minimum value
max(maxtwodice) #maximum value
mean(maxtwodice) #mean
sqrt(var(maxtwodice)) #std. dev.
fivenum(maxtwodice) #five number summary
maxdicebreaks<- c(0:6) + 0.5 #set the breaks for the largest value
hist(maxtwodice, breaks = maxdicebreaks, prob = T)
```

Here is a picture of the probability distribution of the maximum values.

