

Lab2

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```
library(IS606)
```

```
##
## Welcome to CUNY IS606 Statistics and Probability for Data Analytics
## This package is designed to support this course. The text book used
## is OpenIntro Statistics, 3rd Edition. You can read this by typing
## vignette('os3') or visit www.OpenIntro.org.
##
## The getLabs() function will return a list of the labs available.
##
## The demo(package='IS606') will list the demos that are available.

##
## Attaching package: 'IS606'

## The following object is masked from 'package:utils':
##
##      demo
```

```
library(ggplot2)
```

```
load("more/kobe.RData")
head(kobe)
```

```
##      vs game quarter time
## 1 ORL      1          1 9:47
## 2 ORL      1          1 9:07
## 3 ORL      1          1 8:11
## 4 ORL      1          1 7:41
## 5 ORL      1          1 7:03
## 6 ORL      1          1 6:01
##
##                                description basket
## 1                Kobe Bryant makes 4-foot two point shot      H
## 2                Kobe Bryant misses jumper                    M
## 3                Kobe Bryant misses 7-foot jumper            M
## 4 Kobe Bryant makes 16-foot jumper (Derek Fisher assists)      H
## 5                Kobe Bryant makes driving layup             H
## 6                Kobe Bryant misses jumper                    M
```

Using `calc_streak`, compute the streak lengths of `sim_basket`.

1. Describe the distribution of streak lengths. What is the typical streak length for this simulated independent shooter with a 45% shooting percentage? How long is the player's longest streak of baskets in 133 shots?

2. If you were to run the simulation of the independent shooter a second time, how would you expect its streak distribution to compare to the distribution from the question above? Exactly the same? Somewhat similar? Totally different? Explain your reasoning.

3. How does Kobe Bryant's distribution of streak lengths compare to the distribution of streak lengths for the simulated shooter? Using this comparison, do you have evidence that the hot hand model fits Kobe's shooting patterns? Explain.

```
outcomes <- c("H", "M")
sim_basket1 <- sample(outcomes, size = 133, replace = TRUE, prob=c(0.45, 0.55))
```

```
kobe_streak <- calc_streak(kobe$basket)
kobe_streak
```

```
## [1] 1 0 2 0 0 0 3 2 0 3 0 1 3 0 0 0 0 0 1 1 0 4 1 0 1 0 1 0 1 2 0 1 2 1 0
## [36] 0 1 0 0 0 1 1 0 1 0 2 0 0 0 3 0 1 0 1 2 1 0 1 0 0 1 3 3 1 1 0 0 0 0 0
## [71] 1 1 0 0 0 1
```

```
table(kobe_streak)
```

```
## kobe_streak
##  0  1  2  3  4
## 39 24  6  6  1
```

```
summary(kobe_streak)
```

```
##      Min. 1st Qu.  Median    Mean 3rd Qu.    Max.
##  0.0000  0.0000  0.0000  0.7632  1.0000  4.0000
```

```
sim_streak1 <- calc_streak(sim_basket1)
sim_streak1
```

```
## [1] 1 2 0 5 0 0 2 1 0 1 0 0 0 1 1 0 1 0 0 3 3 0 1 0 0 1 0 0 0 3 0 3 0 0 0
## [36] 2 0 2 2 0 3 0 1 0 0 0 0 2 0 1 3 0 1 2 3 1 0 1 3 0 0 1 0 1 0 1 0 0 3 0
## [71] 1
```

```
table(sim_streak1)
```

```
## sim_streak1
##  0  1  2  3  5
## 37 17  7  9  1
```

```
summary(sim_streak1)
```

```
##      Min. 1st Qu.  Median    Mean 3rd Qu.    Max.
## 0.0000  0.0000  0.0000  0.8873  1.0000  5.0000
```

```
multiplot <- function(..., plotlist = NULL, file, cols = 1, layout = NULL) {
  require(grid)

  plots <- c(list(...), plotlist)

  numPlots = length(plots)

  if (is.null(layout)) {
    layout <- matrix(seq(1, cols * ceiling(numPlots/cols)),
                     ncol = cols, nrow = ceiling(numPlots/cols))
  }

  if (numPlots == 1) {
    print(plots[[1]])
  } else {
    grid.newpage()
    pushViewport(viewport(layout = grid.layout(nrow(layout), ncol(layout))))

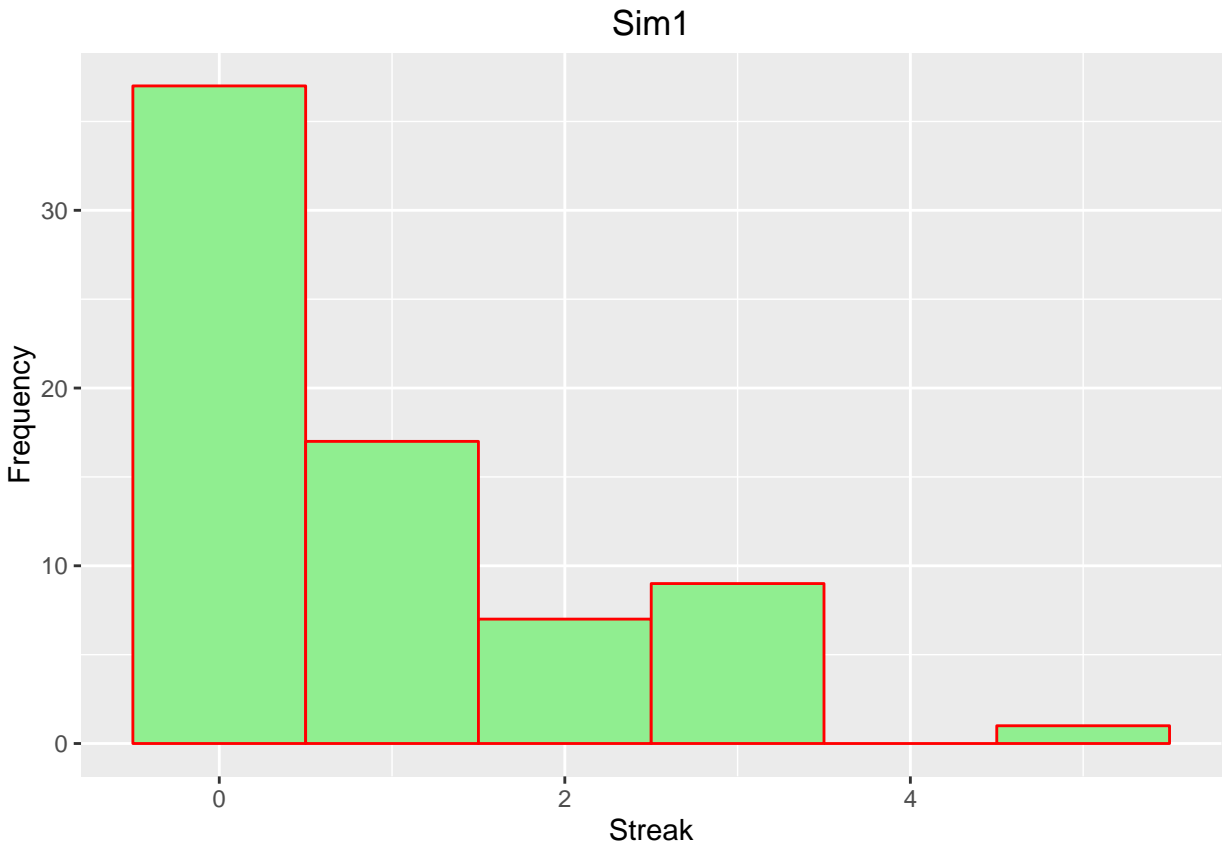
    for (i in 1:numPlots) {
      matchidx <- as.data.frame(which(layout == i, arr.ind = TRUE))

      print(plots[[i]], vp = viewport(layout.pos.row = matchidx$row,
                                       layout.pos.col = matchidx$col))
    }
  }
}
```

Reference: Multiple graphs on one page (ggplot2). (n.d.). Retrieved September 11, 2016, from [http://www.cookbook-r.com/Graphs/Multiple_graphs_on_one_page_\(ggplot2\)/](http://www.cookbook-r.com/Graphs/Multiple_graphs_on_one_page_(ggplot2)/)

```
p2 <- qplot(sim_streak1, geom="histogram", binwidth = 1,
            main = "Sim1",
            xlab = "Streak", ylab = "Frequency",
            fill=I("lightgreen"), col=I("red"))
```

```
p2
```



Answer 1. The distribution of the independent shooter is skewed to the right with typical streak length of 0. Longest streak is:

```
max(sim_streak1)
```

```
## [1] 5
```

Answer 2.

```
outcomes <- c("H", "M")
sim_basket2 <- sample(outcomes, size = 133, replace = TRUE, prob=c(0.45, 0.55))
```

```
sim_streak2 <- calc_streak(sim_basket2)
sim_streak1
```

```
## [1] 1 2 0 5 0 0 2 1 0 1 0 0 0 1 1 0 1 0 0 3 3 0 1 0 0 1 0 0 0 3 0 3 0 0 0
## [36] 2 0 2 2 0 3 0 1 0 0 0 0 2 0 1 3 0 1 2 3 1 0 1 3 0 0 1 0 1 0 1 0 0 3 0
## [71] 1
```

```
table(sim_streak2)
```

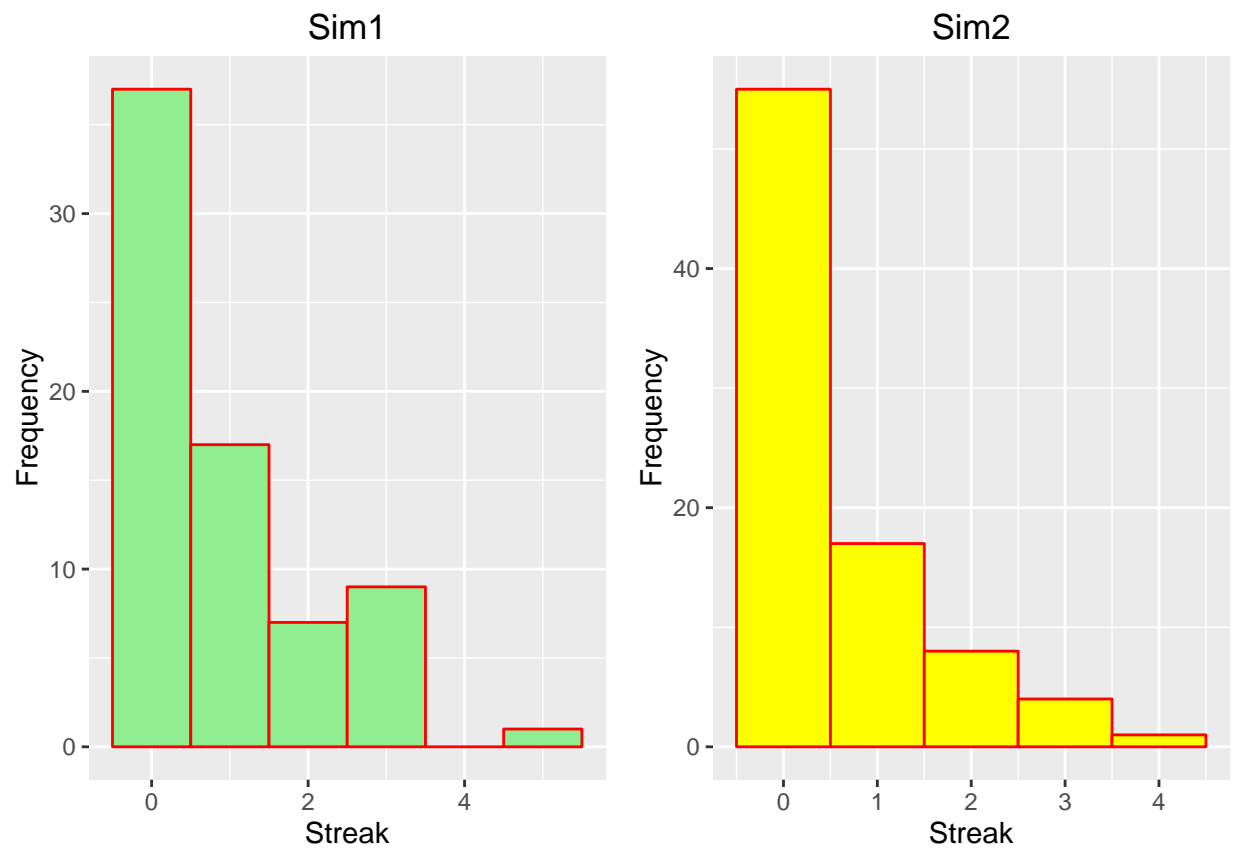
```
## sim_streak2  
## 0 1 2 3 4  
## 55 17 8 4 1
```

```
summary(sim_streak2)
```

```
##      Min. 1st Qu.  Median    Mean 3rd Qu.    Max.  
## 0.0000  0.0000  0.0000  0.5765  1.0000  4.0000
```

```
p3 <- qplot(sim_streak2, geom="histogram", binwidth = 1,  
  main = "Sim2",  
  xlab = "Streak", ylab = "Frequency",  
  fill=I("yellow"), col=I("red"))  
multiplot(p2, p3, cols = 2)
```

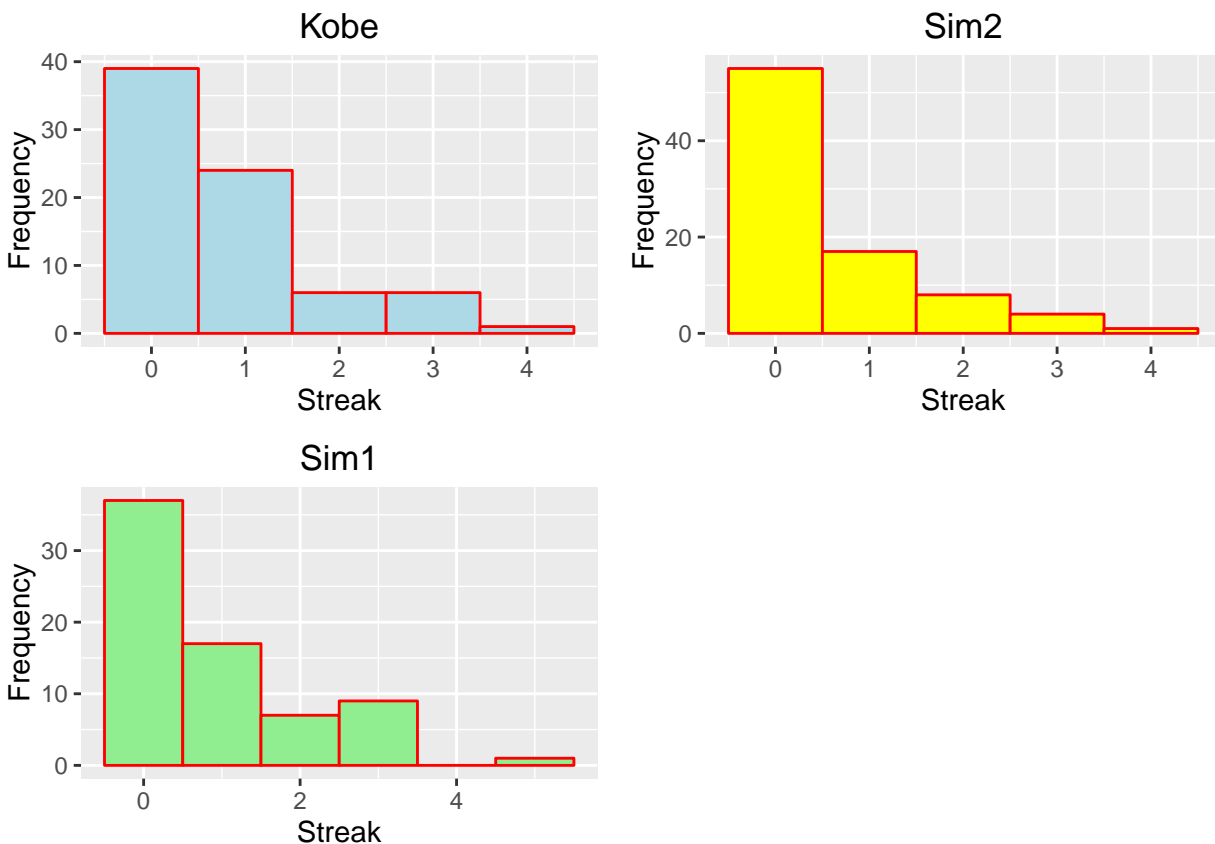
```
## Loading required package: grid
```



If we run the simulation again we can see from the plots above they are somewhat similar, skewness stays the same, typical streak length stays at 0 but the maximum length changes.

Answer 3.

```
p1 <- qplot(kobe_streak, geom="histogram", binwidth = 1,
  main = "Kobe",
  xlab = "Streak", ylab = "Frequency",
  fill=I("lightblue"), col=I("red"))
multiplot(p1, p2, p3, cols = 2)
```



Kobe Bryant's distribution of streak lengths is similar to the simulated independent shooter, skewed to the right and typical streak length of 0. We do not have enough evidence to approve or deny that the hot hand model fits Kobe's shooting patterns but the results indicates that Koby's shooting pattern is an independent event rather than a denendent hot hand event.