STAT 421 Homework 13

Oliver Shanklin

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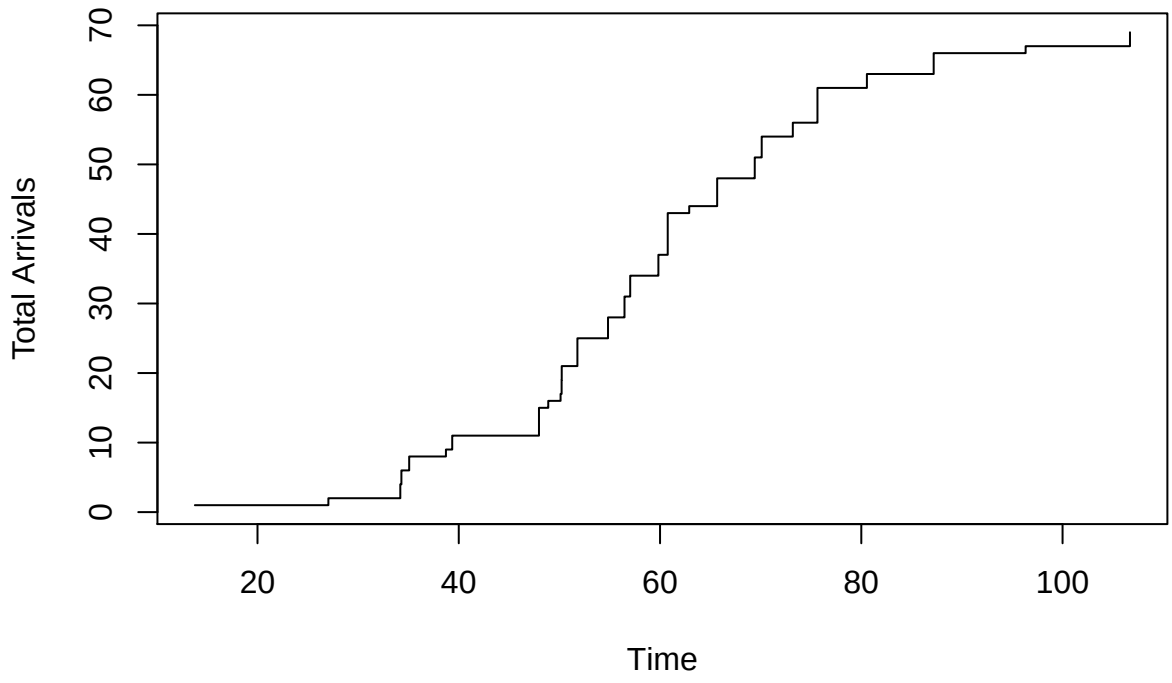
1)

I decided to just put all the code for 1 and 2 in this bit.

```
rateParam = 1/4
jumpsize <- 0

listtime <- list()
listjump <- list()
listsums <- list()


for(j in 1:1000){
  i <-0
  time<-0

  totaljump <- numeric()
  sumjump <- numeric()

  arrivalTimes <- numeric()

  while(time < 100)
  {
    i <- i + 1
    waitTime <- rexp(1, rate = rateParam)

    time <- time + waitTime

    arrivalTimes[i] <- time

    # Jump size rv
    jumpsize <- rpois(1, 2)
    # Adding jumpsize to end of vector
    # need to catch the first itteration because we cant have a index of 0
    if (i == 1){
      sumjump[i] <- jumpsize
    } else {
      sumjump[i] <- sumjump[i-1] + jumpsize
    }

    # indivdual jumps at time
    totaljump[i] <- jumpsize

  }

  listjump[[j]] <- totaljump
  listtime[[j]] <- arrivalTimes
```

```
  listsums[[j]] <- sumjump

}


plot(listtime[[35]], listsums[[35]], type = "s", xlab = "Time", ylab = "Total Arrivals")
```



2)

```
x10 <- numeric()

for(i in 1:length(listjump)){

  j <- 1

  while(TRUE){

    if(listtime[[i]][j] <= 10){

      j <- j + 1

    } else {

      if(j == 1){
        x10[i] <- 0
      } else {
        x10[i] <- listsums[[i]][j-1]
      }
      break;
```

```
    }

  }

}

# Part a)
mean(x10)
```

```
## [1] 5.014
```

```
# Part b)
var(x10)
```

```
## [1] 15.33914
```

```
# Part c)
# P( X(5) = 2)

x5 <- numeric()

for(i in 1:length(listjump)){

  j <- 1

  while(TRUE){

    if(listtime[[i]][j] <= 5){

      j <- j + 1

    } else {

      if(j == 1){
        x5[i] <- 0
      } else {
        x5[i] <- listsums[[i]][j-1]
      }
      break;

    }

  }

}

mean(x5 == 2)
```

```
## [1] 0.134
```