

# Assignment 1

*Rory*

*23 July 2020*

## Question 1

```
my_rbinom <- function(n, size, prob) {  
  apply(seq_len(n), function(x) sum(ifelse(runif(size) <= prob, 1, 0)))  
}  
rb <- my_rbinom(1e5, 10, 0.4)  
head(rb)  
  
## [1] 5 7 2 4 1 2
```

## Question 2

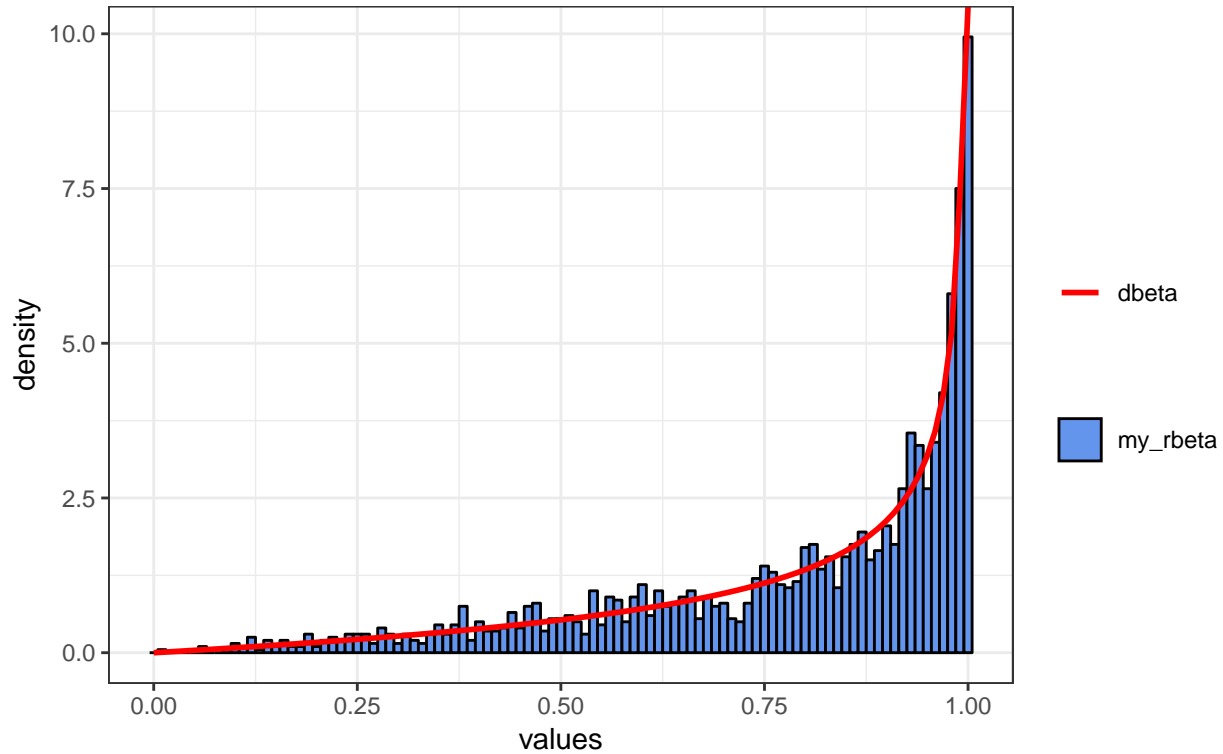
```
my_beta <- function(n, alpha, beta) {  
  params <- c(alpha = alpha, beta = beta)  
  x <- rep_len(NA_real_, length.out = n)  
  count <- 1  
  
  while (count <= n) {  
    u <- runif(2)  
    v <- u^(1/params)  
    w <- sum(u^(1/params))  
    if (w <= 1) {  
      x[count] <- v[1]/w  
      count <- count + 1  
    }  
  }  
  return(x)  
}  
  
n <- 1000  
alpha <- 2  
beta <- 0.5  
  
beta_values <- data.frame(  
  values = c(my_beta(n, alpha, beta), rbeta(n, alpha, beta)),  
  source = c(rep_len("my_rbeta", n), rep_len("rbeta", n)))  
  
ggplot() +  
  geom_histogram(data = beta_values,  
    mapping = aes(x = values, y = ..density.., fill = "cornflowerblue"),  
    colour = "black", binwidth = 0.01) +  
  ggtitle("Comparing density of values generated by custom\nBeta function and R standard Beta function")  
  theme_bw() +  
  stat_function(data = (data.frame(x = seq(0, 1, length.out = 100))),  
    aes(x = x, colour = "red"),
```

```

fun = dbeta, n = 100, args = list(shape1 = alpha, shape2 = beta), size = 1) +
scale_colour_manual("", values = c("red" = "red"), labels = "dbeta") +
scale_fill_manual("", values = c("cornflowerblue" = "cornflowerblue"), labels = "my_rbeta")

```

Comparing density of values generated by custom  
Beta function and R standard Beta function



Question 3

$$F(X) = u = 1 - \exp(-\eta(e^{bx} - 1))$$