```
src/p8.r
             Mon Mar 11 12:00:32 2024
                                              1
 1: df \leftarrow data.frame(a = c(3, 10, 9),
 2:
                      b = c(29, 36, 41)
 3: library(ggplot2)
 4:
    num samples <- 10000000
 5:
    monte_carlo_p8 <- function(alpha, beta) {</pre>
 6:
        theta samples <- rbeta(num samples, alpha, beta)
 7:
        W samples <- rbinom(num samples, 52, theta samples)
 8:
        probability <- mean(W_samples >= 8)
 9:
        cat("Estimated probability:", probability,"\n")
        cat("Num samples:", num_samples, "\n")
10:
11: }
12:
13: for (i in 1:nrow(df)) {
14:
      pair <- df[i,]</pre>
15:
      monte_carlo_p8(pair$a, pair$b)
16: }
17:
18: alpha <- 3
19: beta <- 29
20: theta samples <- rbeta(num samples, alpha, beta)
21: W_samples <- rbinom(num_samples, 52, theta_samples)
22: probability <- mean(W samples >= 8)
23: cat("Estimated probability:", probability,"\n")
24: cat("Num samples:", num_samples, "\n")
25: df <- data.frame(W=W samples)
26:
27: qqplot(df, aes(x = W)) +
28:
      geom_bar(aes(y = ..count.. / sum(..count..)),
29:
               fill = "skyblue", color = "black") +
30:
      labs(title = "PMF of W_samples",
31:
           x = "Number of Wins (W)",
32:
           v = "Probabilitv") +
33:
      theme minimal()
34:
35: ggsave(argv[1])
```