```
 1: library(latex2exp) # for TeX
 2: library(ggplot2)
 3: library(gsl) # for psi
 4:
 5: generate_beta_density <- function(a, b) {
 6:   p <- seq(0, 1, length.out = 1000)
 7:   density <- dbeta(p, a, b)
 8:   data.frame(p = p, density = density)
 9: }
10:
11: beta_entropy <- function(p) {
12:   a <- p[1]
13:   b <- p[2]
14:   psi_sum <- psi(a) + psi(b)
15:   entropy <- log(beta(a, b)) - (a - 1) * psi(a) - (b - 1) * psi(b) + (a + b - 2) * psi_sum
16:   return(entropy)
17: }
18:
19: hypers <- rbind(c(1, 1), c(8, 8), c(7, 13), c(3, 29), c(10, 36), c(9, 41))
20: beta_entropies <- apply(hypers, 1, beta_entropy)
21:
22: df_all <- NULL
23: for (i in 1:nrow(hypers)) {
24:   df <- generate_beta_density(hypers[i, 1], hypers[i, 2])
25:   df$group <- paste("a=", hypers[i, 1], ", b=", hypers[i, 2], "",sep="")
26:   df_all <- rbind(df_all, df)
27: }
28:
29: ggplot(df_all, aes(x = p, y = density, color = group)) +
30:   geom_line() +
31:   labs(x = TeX("$\\theta$"), y = TeX("$p(\\theta; a, b)$"), color = "Parameters") +
32:   theme_minimal() +
33:   theme(legend.position = "top")
34:
35: ggsave(argv[1])
```