2(c)

$prior : f(\theta) \sim Beta(40, 40), where\ \theta \in [0, 1]$

$posterior : f(\theta|Y_1, ..., Y_n) \sim Beta(220, 160), where\ \theta \in [0, 1]$

Considering the likelihood function as a function of θ, and after scaling the likelihood function so that the area under the curve $= 1$, we get: $likelihood : P(Y_1, ..., Y_n|\theta) = g(\theta) \sim Beta(181, 121), where\ \theta \in [0, 1]$

```
theta = seq(0,1,by=0.0001)
prior = dbeta(theta, 40, 40)
posterior = dbeta(theta, 220, 160)
likelihood = dbeta(theta, 181, 121)

plot(theta, posterior, xlab=expression(theta), ylab="density", type="l", col=2)
lines(theta, prior, type="l", col=3)
lines(theta, likelihood, type="l", col=4)
legend(0.05,15, c("posterior","prior","likelihood"), lty=c(1,1,1), col=c(2,3,4))
```