Application exercise FR.2: Bayesian inference review

Submit your responses on Sakai, under the appropriate assignment. Only one submission per team is required. One team will be randomly selected and their responses will be discussed.

Earlier you decided how many M&Ms to buy, accordingly your sample is one of the following:

- $n = 5 \rightarrow$ *RGYBO*
- $n = 10 \rightarrow$ *RGYBO BBGOY*
- $n = 15 \rightarrow$ *RGYBO BBGOY YRBRR*
- $n = 20 \rightarrow$ *RGYBO BBGOY YRBRR GORBY*

Using the data from your sample only and Bayes' theorem, calculate the probability the percentage of yellow is 10% and 20% given the observed data in your sample, i.e.

1. $P(p = 0.10 \mid data)$
2. $P(p = 0.20 \mid data)$

Hint:

$$
\begin{aligned}
P(p = 0.10 \mid data) &= \frac{P(data \mid 10\%yellow) \times P(10\%yellow)}{P(data)} \\
&= \frac{P(data \mid 10\%yellow) \times P(10\%yellow)}{P(data \mid 10\%yellow) \times P(10\%yellow) + P(data \mid 20\%yellow) \times P(20\%yellow)} \\
&= \frac{Binom(k \mid n, p = 0.10) \times P(H_1 : p = 0.10)}{Binom(k \mid n, p = 0.10) \times P(H_1 : p = 0.10) + Binom(k \mid n, p = 0.20) \times P(H_2 : p = 0.20)}
\end{aligned}
$$