

Group Work 02

```
library(bayesrules) # R package for our textbook  
library(tidyverse) # Collection of packages for tidying and plotting data  
library(janitor) # Helper functions like tidy and tabyl
```

1 BR Exercise 2.13

2 BR Exercise 2.18

3 BR Exercise 2.17

4 MLE

If $Y \sim \text{Binom}(n, \pi)$, show that $\hat{\pi}_{MLE} = \frac{Y}{n}$

5 BR Exercise 3.1

For each part, use `plot_beta` and/or `summarize_beta` to justify your answer

6 BR Exercise 3.12

7 Choice of prior

I am interviewing Carleton students about whether or not they have used (knowingly) used ChatGPT on coursework in a non-approved way. I think the proportion has a 90% chance of being less than .25.

- (a) Choose an informative prior that you think is reasonable for this belief

I then ask 20 students this question and 15 respond “yes”. Find the posterior using the prior from above, then using the 3 non/weakly informative priors below:

- (a) $\text{Unif}(0,1)$ prior
- (b) $\text{Beta}(2,2)$ prior
- (c) “Reference” prior $\text{Beta}(.5, .5)$

Compare the posteriors for each of the priors above. Do results change if we instead observe 150/200 students responding “yes”?

8 BR 4.13

i Note

For part (a), you do not need to include your sketch in your submission!