Individual HW03

Your Name Here

```r
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 5.1 a, d, f

For each situation below, tune an appropriate Gamma(s, r) prior model for λ

(a) The most common value of λ is 4, and the mean is 7.
(b) The most common value of λ is 14, and the variance is 6.
(c) The mean of λ is 22, and the variance is 3.

2 BR Exercise 5.7

Let λ be the average number of goals scored in a Women's World Cup game. We'll analyze λ by the following Gamma-Poisson model:

$$Y_i|\lambda \sim \text{Poisson}(\lambda)$$

$$\lambda \sim \text{Gamma}(1, 0.25)$$

(a) Plot and summarize our prior understanding of λ
(b) Why is the Poisson model a reasonable choice for Y_i?
(c) The `wwc_2019_matches` data in the {fivethirtyeight} package includes the number of goals scored by the two teams in each 2019 Women's World Cup match. Define, plot, and discuss the total number of goals scored per game

```r
library(fivethirtyeight)
data("wwc_2019_matches")
wwc_2019_matches <- wwc_2019_matches %>%
  mutate(total_goals = score1 + score2)
```

(d) identify the posterior model of λ and verify your answer using `summarize_gamma_poisson()`

(e) Plot the prior, likelihood, and posterior of λ. Describe the evolution in your understanding of λ from the prior to posterior.

3 BR Exercise 5.15

Below are kernels for Normal, Poisson, Gamma, Beta, and Binomial models. Identify the appropriate model with specific parameter values.

(a) $f(\theta) \propto 0.3^\theta 0.7^{16-\theta}$ for $\theta \in \{0, 1, 2..., 16\}$

(b) $f(\theta) \propto 1/\theta!$ for $\theta \in \{0, 1, ..., \infty\}$

(c) $f(\theta) \propto \theta^4 (1-\theta)^7$ for $\theta \in [0, 1]$

(d) $f(\theta) \propto e^{-\theta^2}$

4 TBA Mon

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7 TBA Wed

8 TBA Wed