Lab 8

Bayesian inference with PyMC

Ex. 1. (2p.) A store is visited by n customers on a given day. The number Y of customers who buy a certain product is distributed as Binomial(n, θ), where θ is the probability that a customer buys that product. Assume that θ is known and that the prior distribution for n is Poisson(10).

a) (0.5p) Use PyMC to compute the *posterior distribution* for n for all combinations of $Y \in \{0, 5, 10\}$ and $\theta \in \{0.2, 0.5\}$. Use az.plot_posterior to visualize all results (ideally in a single window).

b) (0.5p) Explain the effect of Y and θ on the posterior distribution. You can do this in a README.md file to include in the GitHub repository.

c) (0.5p) For each scenario above, use PyMC to generate samples and visualize (with az.plot_dist, for example) the *predictive posterior distribution* for a future number of buyers Y^* given the observed data.

d) (0.5p) In the README.md file, explain how the predictive posterior differs from the posterior for n.