

MATH 559 - EXERCISES 1

Not for Assessment

The Poisson model has mass function

$$f_Y(y; \theta) = \frac{\theta^y \exp\{-\theta\}}{y!} \quad y = 0, 1, 2, \dots$$

and zero otherwise, for parameter $\theta > 0$. Two priors to consider in a Bayesian analysis are

- (i) $\pi_0(\theta) \equiv \text{Gamma}(\alpha_0, \beta_0)$ for $\alpha_0, \beta_0 > 0$;
- (ii) $\pi_0(\theta)$ determined by the assumption that $\phi = \log \theta$ is $\text{Normal}(\eta_0, \tau_0^2)$ distributed *a priori*.

For values of the hyperparameters $\alpha_0, \beta_0, \eta_0, \tau_0^2$ of your choosing, compute and plot the posterior density $\pi_n(\theta)$ under the two priors for the following data, which constitute a sample of size $n = 50$ are displayed in aggregate form. That is, there were two observations with $y = 0$, six with $y = 1$ and so on.

y	0	1	2	3	4	5	6
Count	2	6	7	16	11	6	2