Cheatsheet of some Bayesian Models

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This is an example of a cheatsheet of Bayesian models, the students should complete it and extended with their own comments.

Beta-Bernoulli Model

Likelihood	$Y\|\theta \sim \mathsf{Bernoulli}(\theta)$
Conjugate Prior	$\theta \sim \mathsf{Beta}(\alpha, \beta)$
Interpretation of Hyperparameters	$\alpha - 1$: number of prior successes $\beta - 1$: number of prior fails
Noninformative prior from interpretation	$\theta \sim \mathsf{Beta}(1, 1)$
Posterior	$\theta\|\mathbf{Y} \sim \mathsf{Beta}(\alpha_n, \beta_n)$ $\alpha_n = \alpha + \sum_{i=1}^{n} y_i$, $\beta_n = \beta + n - \sum_{i=1}^{n} y_i$
Posterior Predictive	$Z = \sum_{i=1}^{\tilde{n}} \tilde{Y}_i$, $Z\|\mathbf{Y} \sim \mathsf{Beta\text{-}Binomial}(\tilde{n}, \alpha_n, \beta_n)$
Jeffreys Prior	$\theta \sim \mathsf{Beta}(1/2, 1/2)$

Gamma-Exponential Model

Likelihood	
Conjugate Prior	
Interpretation of Hyperparameters	
Noninformative prior from interpretation	
Posterior	
Posterior Predictive	
Jeffreys Prior	

Gamma-Poisson Model

Likelihood	
Conjugate Prior	
Interpretation of Hyperparameters	
Noninformative prior from interpretation	
Posterior	
Posterior Predictive	
Jeffreys Prior	

Normal Likelihood with Mean Unknown and Variance Known

Likelihood	
Conjugate Prior	
Interpretation of Hyperparameters	
Noninformative prior from interpretation	
Posterior	
Posterior Predictive	
Jeffreys Prior	

$$\mu_n =, \quad \tau_n^2 =$$

Normal Likelihood with Mean Known and Variance Unknown

Likelihood	
Conjugate Prior	
Interpretation of Hyperparameters	
Noninformative prior from interpretation	
Posterior	
Posterior Predictive	
Jeffreys Prior	

$$\nu_n =, \quad \sigma_n^2 =$$

Normal Likelihood with Mean and Variance Unknown

Likelihood	
Conjugate Prior	$\mu\|\sigma^2 \sim$ $\sigma^2 \sim$
	$\mu \sim$ $\sigma^2\|\mu \sim$
Interpretation of Hyperparameters	
Noninformative prior from interpretation	
Posterior	$\mu\|\sigma^2 \sim$ $\sigma^2 \sim$
	$\mu \sim$ $\sigma^2\|\mu \sim$
Posterior Predictive	$Y\|\mathbf{Y} \sim$
Reference Prior	$\mu\|\sigma^2 \sim$ $\sigma^2 \sim$

$$\begin{aligned}
\mu_n &= \\
\kappa_n &= \\
\nu_n &= \\
\nu_n\sigma_n^2 &= \\
s^2 &=
\end{aligned}$$