

Problem 3

$$\text{Prior } \beta \sim \Gamma(\alpha_0, 1)$$

$$\Leftrightarrow \text{Posterior } \beta | \vec{x} \sim \Gamma\left(\alpha_0 + 14(10), 1 + \sum_1^{14} x_i\right)$$
$$\Gamma(\alpha_0 + 140, 1 + 28.21)$$
$$\Gamma(\alpha_0 + 140, 29.21)$$

$$P(\beta | \vec{x}) = \frac{(29.21)^{\alpha_0 + 140}}{(\alpha_0 + 140 - 1)!} \beta^{\alpha_0 + 140 - 1} \cdot e^{-29.21\beta}, \beta > 0$$