Si $X \sim exp(\beta)$

$$p(x) = \frac{1}{\beta} exp\left[-\frac{x}{\beta}\right]$$

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1. a) $\theta | \underset{\sim}{y} \sim \underline{Gamma}(\Sigma x_i + 1, 1+n)$

b) $E(\theta | \underset{\sim}{y}) = 2.125 = \frac{\Sigma x_i + 1}{1+n}$

$$V(\theta | \underset{\sim}{y}) = 0.1328 = \frac{\Sigma x_i + 1}{(1+n)^2}$$

2. $$S^2 = \frac{\sum_{i=1}^{n} (y_i - \bar{y})^2}{n-1}$$

$$= \frac{\Sigma y_i^2 - 2\bar{y}\Sigma y_i + n\bar{y}^2}{n-1}$$

$$= \frac{\Sigma y_i^2 - n2\frac{\Sigma y_i}{n}\frac{\Sigma y_i}{n} + n\bar{y}^2}{n-1}$$

$$s^2 = \frac{\Sigma y_i^2 - 2n\bar{y}^2 + n\bar{y}^2}{n-1}$$

$$s^2 = \frac{\Sigma y_i^2 - n\bar{y}^2}{n-1}$$

$n = 12.$

2 a) $\sigma_0^2 = 227.27$ $\quad V_0 = 2200$

$\mu_n = 225.2308$

$\mu_0 = 220$ $\quad K_0 = 1$

$K_n = n + K_0 = 13$

$\sigma_n^2 = 228.0264$

$$\frac{\sigma_n^2}{K_n} = \frac{17.54}{\;}$$

$\theta | \underset{\sim}{y} \sim t_{2212}(225.23, \underline{17.54})$

b) $$\frac{\theta - 225.23}{\sqrt{17.54}} = t_{2212}$$

$$\theta = t_{2212} \times \sqrt{17.54} + 225.23$$

$$\sim t(1000, 2212)$$

c) $\theta = 220$

$$\sigma^2 | y \sim \text{Gamma-inversa}$$

$$(1106, 2523274.19)$$

$$V = 395.81807$$

$$= \frac{1}{n}\left(\sum y_i^2 - 2\theta \sum y_i + n\theta^2\right)$$

3. $\theta | \underset{\sim}{X} \sim$ Gamma- inversa

$$(n+10, \sum x_i + 0.01)$$

$$(15, 63.01)$$

$$E(\theta | \underset{\sim}{X}) = 4.5007$$

$$V(\theta | \underset{\sim}{X}) = 1.5582$$