Applied Survival Analysis
Solutions to Lab 8: Parametric Survival Analysis

(a) $X_W^2 = \frac{(\hat{\beta}_{gender})^2}{\text{var}(\hat{\beta}_{gender})} = \frac{(0.516)^2}{(0.619)^2} = (8.337)^2 = 69.51 > X^2_{1,0.05} = 3.84$

So we would reject the null hypothesis of no association and conclude that there is significant association between gender and length of stay.

(b)

Coefficients	*Exponential Model*	*Weibull Model*
β_0	0.058	0.088
β_{gender}	0.516	0.414
κ	1	0.614

(c)

Exponential:

Females: $S(1) = P(T \geq 1) = e^{-\lambda_0 \cdot 1} = e^{-1.060 \cdot 1} = 0.347$, where

$\lambda_0 = \exp(\beta_0) = \exp(0.058) = 1.060$

Males: $S(1) = P(T \geq 1) = e^{-\lambda_1 \cdot 1} = e^{-1.775 \cdot 1} = 0.169$, where

$\lambda_1 = \exp(\beta_0 + \beta_1) = \exp(0.058 + 0.516) = 1.775$

Weibull:

Females: $S(1) = P(T \geq 1) = e^{-\lambda_0 \cdot 1^{0.614}} = e^{-(1.092) \cdot 1} = e^{-(1.092)} = 0.336$

$\lambda_0 = \exp(\beta_0) = \exp(0.088) = 1.092$

Males: $S(1) = P(T \geq 1) = e^{-\lambda_1 \cdot 1^{0.614}} = e^{-(1.652) \cdot 1^{0.614}} = e^{-1.652} = 0.192$

$\lambda_1 = \exp(\beta_0 + \beta_1) = \exp(0.088 + 0.414) = 1.652$

(d)

Exponential:

Females: $Mean = \overline{T}_0 = \frac{1}{1.060} = 0.943$ years or approx. 344 days

$Median = M_0 = \frac{-\log(0.5)}{1.060} = 0.654$ years or approx. 239 days

Males: $Mean = \overline{T}_1 = \frac{1}{1.775} = 0.563$ years or approx. 206 days

$Median = M_1 = \frac{-\log(0.5)}{1.775} = 0.391$ years or approx. 143 days

Weibull:

Females: $Mean = \overline{T}_0 = 1.092^{(-1/0.614)}\,\Gamma(1.629+1) = 1.266$ years or approx. 462 days

$$Median = M_0 = \left[\frac{-\log(0.5)}{1.092}\right]^{1.629} = 0.477 \text{ years or approx. 174 days}$$

Males: $Mean = \overline{T}_1 = 1.652^{(-1/0.614)}\,\Gamma(1.629+1) = 0.645$ years or approx. 235 days

$$Median = M_1 = \left[\frac{-\log(0.5)}{1.652}\right]^{1.629} = 0.243 \text{ years or approx. 89 days}$$