Solution

1. Calculate $\hat{\mathbf{b}}$.

$$\hat{\mathbf{b}} = (\mathbf{X}'\mathbf{X})^{-1}\mathbf{X}'\mathbf{y}$$

$$= \left(\begin{bmatrix} 1 & 1 \\ 1 & 3 \\ 1 & 2 \end{bmatrix}' \begin{bmatrix} 1 & 1 \\ 1 & 3 \\ 1 & 2 \end{bmatrix} \right)^{-1} \begin{bmatrix} 1 & 1 \\ 1 & 3 \\ 1 & 2 \end{bmatrix}' \begin{bmatrix} 2 \\ 3 \\ 1 \end{bmatrix}$$

$$= \begin{bmatrix} 1 \\ 0.5 \end{bmatrix}$$

2. Our goal is to find a and b in the following equation: $Survival = a + b \cdot Oil$. You calculated them from the previous question. Re-write the equation with the values from $\hat{\mathbf{b}}$.

$$\begin{bmatrix} a \\ b \end{bmatrix} = \begin{bmatrix} 1 \\ 0.5 \end{bmatrix}$$
$$Survival = 1 + 0.5 \cdot Oil$$