|  |  |  |
| --- | --- | --- |
| Assignment 5 – Part 2 | September 24  15338673 | |
| PW Janse van Rensburg | | Survival Analysis |

Contents

[Question 4 2](#_Toc20168579)

[Question 5 4](#_Toc20168580)

# Question 4

|  |  |  |  |
| --- | --- | --- | --- |
|  | Variables | Degrees of Freedom | AIC |
| Base |  | 1 | 437.553 |
| Step 1 |  | 1 | 436.398 |
|  | **1** | **429.704** |
|  | 1 | 438.600 |
|  | 3 | 435.922 |
| Step 2 |  | 1 | 431.265 |
|  | **1** | **427.764** |
|  | 1 | 431.295 |
| Step 3 |  | **1** | **427.617** |
|  | 1 | 429.159 |
| Step 4 |  | 1 | 429.242 |

Final model:

where:

With:

And:

With the final parameters estimated as below:

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Analysis of Maximum Likelihood Estimates | | | | | | |
| Parameter | **DF** |  | **σ** | **ꭓ2** | **p-value** | **Hazard Ratio** |
|  | 1 | -0.64606 | 0.29888 | 4.6726 | 0.0306 | 0.524 |
|  | 1 | 1.57286 | 1.08720 | 2.0930 | 0.1480 | 4.820 |
|  | 1 | 2.04745 | 1.08942 | 3.5321 | 0.0602 | 7.748 |
|  | 1 | 1.01094 | 1.01735 | 0.9874 | 0.3204 | 2.748 |
|  | 1 | 2.26988 | 1.02561 | 4.8983 | 0.0269 | 9.678 |
|  | 1 | -0.55159 | 0.39655 | 1.9348 | 0.1642 | 0.576 |

For the hypothesis of primary interest, we have the null hypothesis as follows:

With the model as proposed, we reject the null hypothesis of in favor of the alternative that and conclude that the type of treatment (either routine bathing or body cleansing) does indeed have an impact on the time to straphylocous aureaus infection.

# Question 5

For question 1 we had the following hypothesis:

With the model now consisting of only the treatment type and percentage burn area, we have the model as follows:

With

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Analysis of Maximum Likelihood Estimates | | | | | | |
| Parameter | **DF** |  | **σ** | **ꭓ2** | **p-value** | **Hazard Ratio** |
|  | 1 | -0.52328 | 0.29581 | 3.1293 | 0.0769 | 0.593 |
|  | 1 | 0.00719 | 0.00714 | 1.0123 | 0.3143 | 1.007 |

We estimate the survival function as follows:

With and Z as above. For the current sample, we obtain the following results using the abovementioned formula:

|  |  |  |  |
| --- | --- | --- | --- |
| Obs |  |  |  |
| 1 | 0 | 15 | 0.74792 |
| 2 | 0 | 20 | 0.78208 |
| 3 | 0 | 15 | 0.82015 |
| 4 | 0 | 20 | 0.6308 |
| 5 | 0 | 70 | 0.85865 |
| … | … | … | … |
| 66 | 0 | 15 | 0.66649 |
| 67 | 0 | 70 | 0.30434 |
| 68 | 0 | 6 | 0.8304 |
| 69 | 0 | 20 | 0.83739 |
| 70 | 0 | 36 | 0.59636 |

|  |  |  |  |
| --- | --- | --- | --- |
|  |  |  |  |
| 71 | 1 | 50 | 0.78664 |
| 72 | 1 | 21 | 0.75957 |
| 73 | 1 | 16 | 0.86803 |
| 74 | 1 | 3 | 0.84265 |
| 75 | 1 | 5 | 0.98315 |
| … | … | … | … |
| 150 | 1 | 7 | 0.81852 |
| 151 | 1 | 20 | 0.80262 |
| 152 | 1 | 15 | 0.72967 |
| 153 | 1 | 10 | 0.98254 |
| 154 | 1 | 35 | 0.73778 |

Estimating specifically for an individual with 25% total body area burns, we obtain the following result, again using the abovementioned formula, however this time we set :