1)

a) $h_0(t) = \dfrac{\xi}{1 + \xi(t)}$ to obtain the cumulative hazard function, we integrate the baseline.

$$\int \frac{\varepsilon}{1+\varepsilon(t)}\,dt$$

$$\downarrow$$

$$\varepsilon \int \frac{1}{1+\varepsilon(t)} \xrightarrow[\text{u-sub}]{} \varepsilon \int \frac{1}{\varepsilon(u)}\,du$$

$$\varepsilon \frac{1}{\varepsilon} \cdot \int \frac{1}{u}\,du \rightarrow \varepsilon \frac{1}{\varepsilon} \ln|u|$$

$$\varepsilon \frac{1}{\varepsilon} \ln|1+\varepsilon(t)| = \ln|1+\xi(t)|$$

The survival function is equal to

$$\exp(-H(t))$$

$$e^{-(\ln|1+\varepsilon t|)}$$

$$\downarrow$$

$$\frac{1}{e^{\ln|1+\varepsilon t|}} \rightarrow \frac{1}{|1+\varepsilon(t)|}$$

2)

a) The hazard function is a log-logistic AFT model.

baseline hazard : $h_0(t) = \dfrac{e^{\theta} K t^{K-1}}{1 + e^{\theta} t^{K}}$

$h_i(t) = e^{-\alpha x_i} \; h_0(te^{-\alpha x_i})$

$x_i = \begin{cases} 1 & \text{group1} \\ 0 & \text{group2} \end{cases}$

b) $\mu = 6.4723$

$\sigma = 0.9831$

$\theta = -6.4725 / 0.5567 = -11.6265$

$K = 1/0.9831 = 1.01719052$

$\alpha = -1.3272$

c) The hazard ratio is $e^{0.832005}$
or 2.2979177
A treated patient will have 2.2979 the odds of resolving their sickness in comparison to an untreated patient.

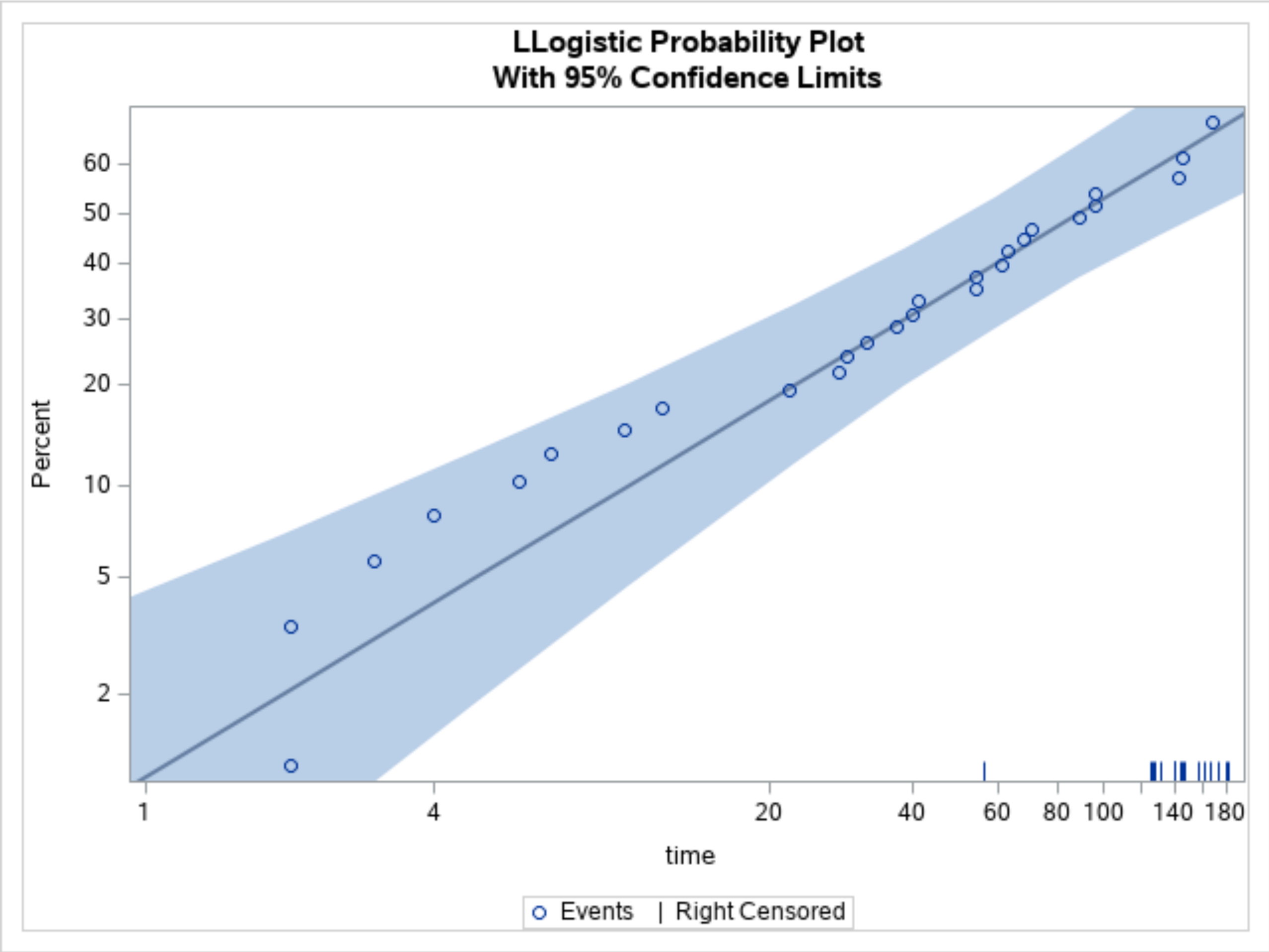
d) $\frac{159.3667}{55.5236} = 2.87025$

People who were on the treated experienced a survival time 2.8703 times that of those who were not.

e) $e^{1.3272} = 3.77047$. People in the treated group had a median survival time which was 3.7705 times that of those in the untreated group.

f) see attached plot.

e) In comparing the log-likelihood, we can see that the Weibull model has a 135.408 log-likelihood, and the log-logistic has a 132.494 likelihood. Using this statistic, we would say the weibull fits the data better.


LLogistic Probability Plot
With 95% Confidence Limits
Percent
60
50
40
30
20
10
5
2
1
4
20
40
60
80
100
140
180
time
Events
Right Censored