Homework4

Yuki Joyama

```
# import data
df = haven::read_dta("./data/umaru.dta")
```

1. Parametric/Accelerated Failure Time Models

a.

Variables: age, nonwhite, treat, site, ivdrug
Models: Exponential, Weibull, Log-logistic, Log-normal, Generalized Gamma

```
# define the survival object
surv_object <- Surv(time = df$time, event = df$censor)

# fit AFT models with different distributions
aft_exponential <-
  flexsurvreg(surv_object ~ age + nonwhite + treat + site + ivdrug, data = df, dist = "exponential")
aft_weibull <-
  flexsurvreg(surv_object ~ age + nonwhite + treat + site + ivdrug, data = df, dist = "weibull")
aft_llogis <-
  flexsurvreg(surv_object ~ age + nonwhite + treat + site + ivdrug, data = df, dist = "llogis")
aft_lognormal <-
  flexsurvreg(surv_object ~ age + nonwhite + treat + site + ivdrug, data = df, dist = "lognormal")
aft_gen_gamma <-
  flexsurvreg(surv_object ~ age + nonwhite + treat + site + ivdrug, data = df, dist = "gengamma")

# check the results
# aft_exponential
# aft_weibull
# aft_llogis
# aft_lognormal
# aft_gen_gamma
```

i. Values of the -2 log L, the total number of parameters (including shape and scale for ϵ) and the AIC for each of these models

```
# extract the log-likelihood, total parameters, and AIC
results <- data.frame(
  Model = c("Exponential", "Weibull", "Log-logistic", "Log-normal", "Generalized Gamma"),
  "-2LogL" = c(
    -2 * aft_exponential$loglik,
```

```
    -2 * aft_weibull$loglik,
    -2 * aft_llogis$loglik,
    -2 * aft_lognormal$loglik,
    -2 * aft_gen_gamma$loglik
  ),
  "Total Parameters" = c(
    aft_exponential$npars,
    aft_weibull$npars,
    aft_llogis$npars,
    aft_lognormal$npars,
    aft_gen_gamma$npars
  ),
  AIC = c(
    aft_exponential$AIC,
    aft_weibull$AIC,
    aft_llogis$AIC,
    aft_lognormal$AIC,
    aft_gen_gamma$AIC
  )
)

colnames(results) <- c("Model", "-2 Log L", "Total Parameters", "AIC")

results |>
  kable()
```

Model	-2 Log L	Total Parameters	AIC
Exponential	6180.608	6	6192.608
Weibull	6179.805	7	6193.805
Log-logistic	6127.191	7	6141.191
Log-normal	6137.951	7	6151.951
Generalized Gamma	6137.219	8	6153.219

ii.

iii.

b.

c.

d.

2. Hazard Rates and Survival from Parametric Models

a.

b.

c.

d.