Problem Set 4

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Due: April 4, 2022

Instructions

- Please show your work! You may lose points by simply writing in the answer. If the problem requires you to execute commands in `R`, please include the code you used to get your answers. Please also include the `.R` file that contains your code. If you are not sure if work needs to be shown for a particular problem, please ask.
- Your homework should be submitted electronically on GitHub in `.pdf` form.
- This problem set is due before class on Monday April 4, 2022. No late assignments will be accepted.
- Total available points for this homework is 80.

Question 1

We're interested in modeling the historical causes of infant mortality. We have data from 5641 first-born in seven Swedish parishes 1820-1895. Using the "infants" dataset in the `eha` library, fit a Cox Proportional Hazard model using mother's age and infant's gender as covariates. Present and interpret the output. First I need to fit a survival model, based on age of death and whether they exited the study through death or through censoring.

```
infants_surv <- with (infants, Surv(enter, exit, event))
```

Second, I use the survival model and put it into the cox proportional hazard model

```
cox <- coxph(infants_surv ~ age + sex, data = infants)
summary(cox)
```

```
Call:
coxph(formula = infants_surv ~ age + sex, data = infants)
```

```
  n= 105, number of events= 21

           coef exp(coef) se(coef)      z Pr(>|z|)
age    -0.04044   0.96037  0.04507 -0.897    0.370
sexboy -0.48518   0.61559  0.44224 -1.097    0.273

       exp(coef) exp(-coef) lower .95 upper .95
age       0.9604      1.041    0.8792     1.049
sexboy    0.6156      1.624    0.2587     1.465

Concordance= 0.586  (se = 0.058 )
Likelihood ratio test= 1.99  on 2 df,   p=0.4
Wald test            = 2  on 2 df,   p=0.4
Score (logrank) test = 2.03  on 2 df,   p=0.4

[1] 1.749304e-44
```

An exponentiated age coefficient of .96 tells me that older mothers lead to a 4 per cent increase in infant and maternal mortality, holding sex constant. An exponentied sexboy coefficient of .6 tells me that boys are 40 per cent less likely to survive, holding age of the mother constant.