Problem Set 4 - Applied Stats II

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Due: April 10, 2023

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 23:59 on Sunday April 16, 2023. No late assignments will be accepted.

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.

```
# download the dataset

data("infants")

# Cox Proportional Hazard model

# Surv object
child_surv <- with(infants, Surv(enter, exit, event))

# Model
cox <- coxph(child_surv ~ sex + age, data = infants)
summary(cox)
drop1(cox, test = "Chisq")
stargazer(cox, type = "text")
stargazer(cox, type = "latex")

```

```r
# Plotting
cox_fit <- survfit(cox)
autoplot(cox_fit)
```

Table 1: Infants Cox Proportional Hazard model

	Dependent variable:
	child_surv
sexboy	−0.485
	(0.442)
age	−0.040
	(0.045)
Observations	105
R^2	0.019
Max. Possible R^2	0.800
Log Likelihood	−83.626
Wald Test	2.000 (df = 2)
LR Test	1.992 (df = 2)
Score (Logrank) Test	2.034 (df = 2)
Note:	*p<0.1; **p<0.05; ***p<0.01

There is a 0.485 decrease in the expected log of the hazard for male babies compared to female, holding mother's age as a constant. There is a 0.04 increase in the expected log of the hazard for infants of with mother's age. The hazard ratio of male babies is 0.61 that of female babies with a 4% change in the mother's age.

	Odds_and_OR	2.5 %	97.5 %
sexboy	0.616	0.259	1.465
age	0.960	0.879	1.049

Figure 1: Kaplan-Meier Plot