University of California, Davis
Department of Public Health Sciences

Fall 2024	**Survival Analysis**	**BST 222**
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Homework Assignment 5
Due November 19, 2024

The addicts data set is from a study by Caplehorn et al. ("Methadone Dosage and Retention of Patients in Maintenance Treatment," Med. J. Aust., 1991). These data comprise the times in days spent by heroin addicts from entry to departure from one of two methadone clinics. There are two further covariates, namely, prison record and methadone dose, believed to affect the survival times.

The data set and R input code are on the website. The variables are as follows: **id:** Subject ID; **clinic:** Clinic (1 or 2); **status:** Survival status (0 = censored, 1 = departed from clinic); **time:** Survival time in days; **prison:** Prison record (0 = none, 1 = any); **methadone:** Methadone dose (mg/day).

1. Fit the Cox model with clinics as strata and prison and methadone as variables. Use this model for the remaining questions.

2. Test proportionality of hazards with `cox.zph` on the model with strata(clinic), prison, and methadone. Make the plots vs. time of the Schoenfeld residuals for prison, and methadone. Interpret the results

3. Plot the cumulative hazard of the Cox-Snell residuals and interpret the apparent goodness of fit.

4. Plot the martingale residuals (omitting methadone) vs. methodone. Is there substantial evidence that methadone should be transformed?

5. Plot the martingale residuals vs. the linear predictor, the deviance residuals vs. the linear predictor, and the two dfbeta values by observation order. Identify possibly interesting observations and try to interpret the results.