

Plan for this exercise session

- ★ Problem 4.1 in ABG. Give also an interpretation of the expressions you get for $U(\beta)$ and $\mathbb{I}(\beta)$.
- ★ Interpretation of Cox model R output

- ★ The R output below shows some results when estimating a Cox model to a survival data set of 241 individuals with monoclonal gammopathy of undetermined significance (MGUS). The fitted model has three covariates: age, sex and mspike. The covariate sex is binary, whereas the covariates age and mspike are both continuous. In the data set the values of the covariate age varies from 34 to 90, and the values for mspike varies from 0.3 to 3.2.

★ `> res.cox = coxph(Surv(futime,death) ~ age + sex + mspike,data=mgus) > summary(res.cox)`

Call:

`coxph(formula = Surv(futime, death) ~ age + sex + mspike, data = mgus)`

`n= 241, number of events= 225`

	coef	exp(coef)	se(coef)	z	Pr(> z)
age	0.066748	1.069026	0.007051	9.466	<2e-16 ***
sexmale	0.236694	1.267053	0.136816	1.730	0.0836 .
mspike	-0.084901	0.918603	0.170947	-0.497	0.6194

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Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

	exp(coef)	exp(-coef)	lower .95	upper .95
age	1.0690	0.9354	1.0544	1.084
sexmale	1.2671	0.7892	0.9690	1.657
mspike	0.9186	1.0886	0.6571	1.284

Concordance= 0.689 (se = 0.019)

Likelihood ratio test = 104 on 3 df, p=<2e-16

Wald test = 96.48 on 3 df, p=<2e-16

Score (logrank) test = 100.2 on 3 df, p=<2e-16

`> res.cox$var`

```
[, 1][, 2][, 3]
[1,] 4.972337e-05 -7.378061e-05 4.857322e-05
[2,] -7.378061e-05 1.871872e-02 1.957005e-04
[3,] 4.857322e-05 1.957005e-04 2.922280e-02
```