Solutions to tutorial 6

Read in the data:

```r
library(survival)
cln=c('id','t','delta','t_d','delta_d','treat','treat_group','cd4','sex','race','ivd','haemo','karnof','cd4_base','prior_zdv','age')
attach(read.table("actg320.dat",col.names=cln));t=t/365.25
S=Surv(t,delta)

[1–2] Here is the fit for the simplest model:

wei=survreg(S~1,dist="w")
kappa=1/wei$scale
lambda=exp(-wei$coeff[1])^kappa
zeit=(0:365)/365
s=exp(-lambda*zeit^kappa)
plot(survfit(S~1),xlab='t',ylab=expression(hat(S)(t)),lty=1,
    conf.int=FALSE,mark.time=FALSE,ylim=c(0.9,1);lines(zeit,s,col=2)

The fit looks reasonable.
```
Include treatment as a covariate:

```r
wei=survreg(S~treat,dist="w")
kappa=1/wei$scale
lambda1=exp(-wei$coeff[1])^kappa
lambda2=exp(-wei$coeff[1]-wei$coeff[2])^kappa
s1=exp(-lambda1*zeit^kappa)
s2=exp(-lambda2*zeit^kappa)
plot(survfit(S~treat),xlab='t',ylab=expression(hat(S)(t)),lty=2,
     conf.int=FALSE,mark.time=FALSE,ylim=c(0.85,1),col=1:2)
lines(zeit,s1,col=1,lwd=2);lines(zeit,s2,col=2,lwd=2)
```
cox=coxph(S~treat); dcox=coxph.detail(cox)
toki=dcox$time; h0=dcox$hazard; S0=exp(-cumsum(h0))
beta=cox$coef; xmean=mean(treat)
x1=0-xmean; x2=1-xmean
S1=S0^(exp(beta*x1)); S2=S0^(exp(beta*x2))
lines(toki,S1,col=1,type='s'); lines(toki,S2,col=2,type='s')

km=survfit(S~treat)
m=1; n=km$strata[1]
temp=km$time[m:n]
cloglog=log(-log(km$surv[m:n]))
plot(log(temp),cloglog,type='s',xlab='log(t)',
     ylab=expression(log(-log(hat(S)(t)))))
m=n+1;n=n+km$strata[2]
temp=km$time[m:n]
cloglog=log(-log(km$surv[m:n]))
lines(log(temp),cloglog,col=2,type='s')

There's a suggestion of inappropriateness for the treatment for early times, but it doesn't look too bad.
Thus, treatment, Karnofsky score and baseline cd4 seem to have a strong effect on survival. There is some suggestion of an effect of age and intravenous drug use, but these could well be spurious effects caused by the large number of tests we are attempting.