The objective of this lab is to use a Kaplan-Meier survival model to test if survival differs with herbicide treatment type for two different plant species. Lab is due on November 4, 2008. NO EMAILS, please turn in paper copies.

Question 1: What is the mean, and median survival days for each plant species and herbicide treatment?
Question 2: What is the approximate day at which 50% of the plants will be dead for each treatment and species?
Question 3: Are there differences in survival for each herbicide treatment for each plant species (two tests). A simple test is to see if the 95% CI overlap but R and SAS both have options to do survival test (see ?survdiff in R). Make plots of the survival functions (plotting directions below) and include these plots in your answers.

Data set details:
Two species of exotic plant were sprayed with two herbicides (N=20 plants each per species per herbicide)and survival was monitored daily.

Data represent days to mortality (Days), status (1=not censored, 0=censored), Treat = herbicide treatment (1 or 2), and Species (Brazilian Pepper or Meleleuca);

Here is part of the data below

Days	Status	Treat	Species
179	1	1	Meleluc
256	1	1	Meleluc
262	1	1	BP
224	0	1	Meleluc
256	1	1	Meleluc
291	1	2	BP

****
Some SAS type code (to get you started, may be useful for R users too)

```
*READ IN YOUR DATA
proc sort;
  by herbtype; *Sort the data out by herbicide type
proc means mean min max std cv n; *just calculating the mean days to survival
 by herbtype;
 var Days;
 run;

*the status(0) tells SAS the variable status at level 0 is censored;

proc lifetest plots=(s,ls,lls) method=km;
time days*status(0);
strata herbtype;

*then next test controls for species when testing for diffs in survival with Herbtype;

proc lifetest notable method=km;
time days*status(0);
strata Species;
test herbtype;

run;
```

```
########################################
################R type code############
########################################
#make sure you have the survival package#
```

```
library(survival)

#Here are the help files for R
#?Surv
#?survfit
#?survdiff

###This is just skeleton code to help get you started######
#The routines in survival work with objects of class Surv#
#Surv is a data structure that combines times and censoring#
#information.  Surv can take two arguments, observation time#
#and event indicator#
#To compute the Kaplan-Meier estimator use the survfit function.#
#This function in its simplest form uses a Surv object.#


graphics.off()
if(exists(".SavedPlots",where=1)==T){rm(.SavedPlots,pos=1)}
windows(record=T); par(las=1)

#above is handy code so you can page up and page down to see graphs

rm(list=ls(all=TRUE))
library('survival')

#setwd('C:/Documents and Settings/billpine/My Documents/UF
Teaching/Ecol_stats/2008/Pine_EcoStats_2008/BP_Survival_Lab')
alldata=read.table("plant_survival_data.txt",header=T,sep="")

#above I'm just reading in my data into the file called alldata

#plant_bp=subset(alldata, Species=='bp')
#above is one way to subset data types, may or may not be useful

#Here is another subset approach
#sub=surv(Days{species==’Cactus’][Treat==1],status[species==’Willow’][Treat==6])


attach(alldata)

fullSurv=Surv(Days, Status==1)
survfit(fullSurv)

surv.all<-survfit(fullSurv)

summary(surv.all)

#now do this by treatment, but remember for the question you
#will need to do this by treatment for each plant type
#this is just a demo you can either subset the data with different commands
#or create multiple data files

surv.byherb<-survfit(Surv(Days,Status)~Treat)

#R can make the KM plots easily
plot(surv.all)

plot(surv.byherb)
```

#may look goofy b/c I'm using combined data in the example

#This will test for differences between the two curves
survdiff(Surv(Days, Status)~Treat)