lab1 zhongyun_zhang

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2019/10/6

Problem 1

a)

First, we need to import vets.txt Second, we read in the first column of data as a vector and call it vet.time

```
vets <- read.table("~/Desktop/2019 Fall/PSTAT 175/lab1/vets.txt", quote="\"", comment.char="")
head(vets)
```

```
##    V1 V2
## 1  72  1
## 2 411  1
## 3 228  1
## 4 126  1
## 5 118  1
## 6  10  1
```

```
vet.time<-vets$V1
```

b)

We read second column as a vector vet.cns, in this column, 1 is an event occured for that patient and 0 is when that patient is censored

```
vet.cns<-vets$V2
```

c)

First, we need to load library survival. Second, we create a function called vet.surv by using the Surv function. Third, we print out the result.

```
#install.packages("survival")
library(survival)
vet.surv<-Surv(vet.time,vet.cns)
print(vet.surv)
```

```
##   [1]  72  411  228  126  118   10   82  110  314  100+  42    8  144   25+
##  [15]  11   30  384    4   54   13  123+  97+ 153   59  117   16  151   22
##  [29]  56   21   18  139   20   31   52  287   18   51  122   27   54    7
##  [43]  63  392   10    8   92   35  117  132   12  162    3   95  177  162
##  [57] 216  553  278   12  260  200  156  182+ 143  105  103  250  100  999
##  [71] 112   87+ 231+ 242  991  111    1  587  389   33   25  357  467  201
##  [85]   1   30   44  283   15   25  103+  21   13   87    2   20    7   24
##  [99]  99    8   99   61   25   95   80   51   29   24   18   83+  31   51
## [113]  90   52   73    8   36   48    7  140  186   84   19   45   80   52
## [127] 164   19   53   15   43  340  133  111  231  378   49
```

d)

There are 137 patients in the data, and we use function mean to compute the average survival time of patients

```r
mean(vet.time)
```

```
## [1] 121.6277
```

This may be a biased estimate of the average time until an event, since this calculated mean time(121.6677) contains survival time for patients with an event occured and survival time for patients who were censored. In this way, the mean is not the mean time for patients who got the event. In order to get the accurate average time until an event, we need to exclude those time that parients were censored.

e)

Calculate sum(vet.cns) and sum(vet.time*vet.cns) by using function sum

```r
sum(vet.cns)
```

```
## [1] 128
```

```r
sum(vet.time*vet.cns)
```

```
## [1] 15632
```

For sum of vet.cns, it is actually adding up all patients who had an event occured. There are 128 peole who had an event occured. For sum of vet.time*vet.cns, 15632 is the total amount of time for all patients who had an event occured on themselves.

f)

We calculate function mean(vet.surv).

```r
mean(vet.surv)
```

```
## [1] 61.28102
```

This mean is the mean time for patients who had event happend.(Exclude patients who were censored)

Problem2

a)

Construct a survival object ret.surv by using Surv function. First, we need to load library survival

```r
#install.packages("survival")
library(survival)
```

Second, we need to import retire.txt

```r
setwd("~/Desktop/2019 Fall/PSTAT 175/lab1")
retire <- read.table("retire.txt", header=TRUE,skip=2)
```

Third, we can construct surv function

```r
ret.time<-retire$time
ret.death<-retire$death
ret.surv<-Surv(ret.time,ret.death)
```

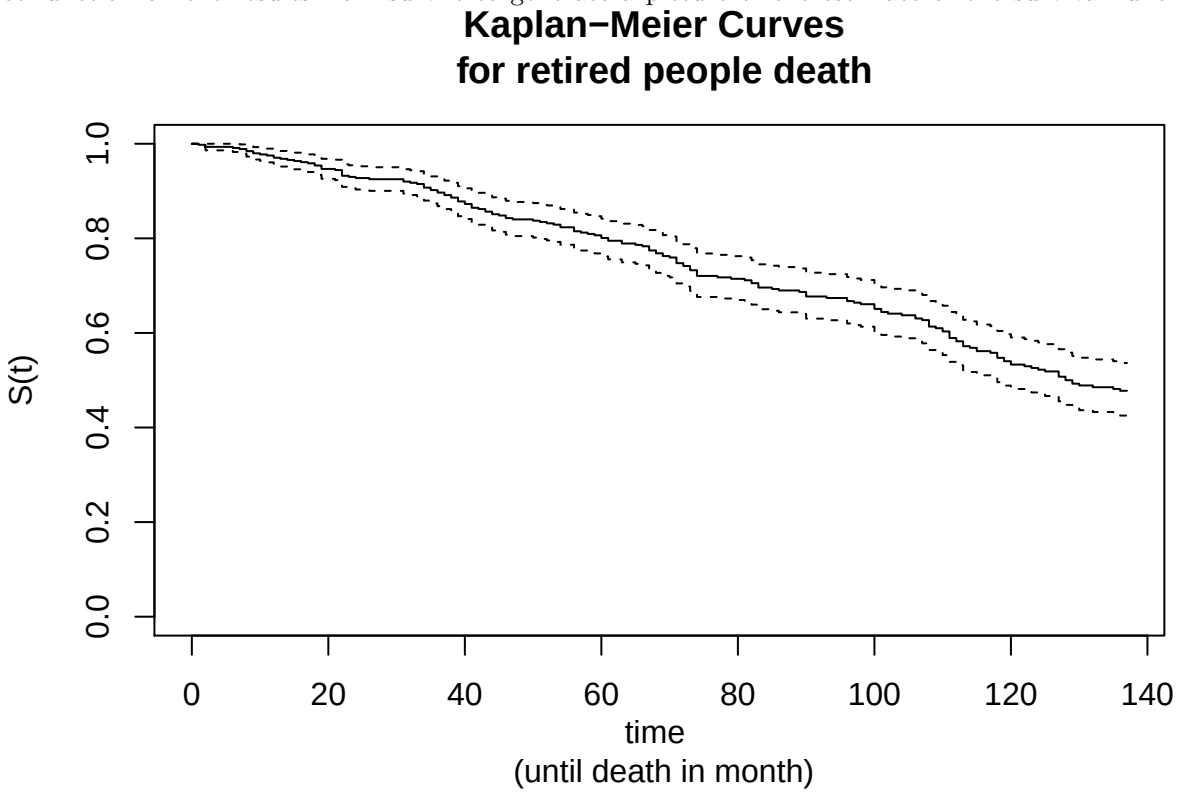
b)

The function survfit calulates a Kaplan–Meier estimate of the survival function.

```r
retire.fit<-survfit(ret.surv ~ 1)
```

c)

Use plot function on the results from survfit to generate a picture of the estimate of the survival function.



##d) Use the summary function on the results from survfit to generate a summary of the survival function.

```
summary(retire.fit)
```

```
## Call: survfit(formula = ret.surv ~ 1)
##
##  time n.risk n.event survival std.err lower 95% CI upper 95% CI
##     1    458       1    0.998 0.00218        0.994        1.000
##     2    457       2    0.993 0.00377        0.986        1.000
##     6    440       1    0.991 0.00439        0.983        1.000
##     7    438       1    0.989 0.00492        0.979        0.999
##     8    434       2    0.984 0.00586        0.973        0.996
##     9    427       2    0.980 0.00668        0.967        0.993
##    10    424       1    0.977 0.00705        0.964        0.991
##    11    423       1    0.975 0.00740        0.961        0.990
##    12    420       2    0.970 0.00806        0.955        0.986
##    13    415       1    0.968 0.00838        0.952        0.985
##    14    412       1    0.966 0.00868        0.949        0.983
##    15    411       1    0.963 0.00897        0.946        0.981
##    16    408       1    0.961 0.00926        0.943        0.979
##    17    406       1    0.959 0.00953        0.940        0.978
##    18    404       2    0.954 0.01006        0.934        0.974
##    19    399       3    0.947 0.01080        0.926        0.968
##    21    393       1    0.944 0.01104        0.923        0.966
##    22    392       5    0.932 0.01214        0.909        0.956
##    23    386       1    0.930 0.01235        0.906        0.954
##    24    384       1    0.928 0.01255        0.903        0.952
```

```
##    26     380       1    0.925 0.01275        0.900        0.950
##    31     367       2    0.920 0.01317        0.895        0.946
##    32     362       1    0.917 0.01338        0.892        0.944
##    33     359       1    0.915 0.01358        0.889        0.942
##    34     356       3    0.907 0.01418        0.880        0.935
##    35     351       2    0.902 0.01456        0.874        0.931
##    36     343       2    0.897 0.01494        0.868        0.927
##    37     337       2    0.891 0.01532        0.862        0.922
##    38     333       2    0.886 0.01569        0.856        0.917
##    39     330       3    0.878 0.01622        0.847        0.910
##    40     327       2    0.873 0.01656        0.841        0.906
##    41     324       3    0.865 0.01705        0.832        0.899
##    42     319       1    0.862 0.01721        0.829        0.896
##    43     317       2    0.856 0.01753        0.823        0.892
##    44     315       2    0.851 0.01784        0.817        0.887
##    45     312       1    0.848 0.01799        0.814        0.884
##    46     310       2    0.843 0.01828        0.808        0.879
##    47     307       1    0.840 0.01843        0.805        0.877
##    50     304       1    0.837 0.01857        0.802        0.875
##    51     302       1    0.835 0.01872        0.799        0.872
##    52     301       1    0.832 0.01886        0.796        0.870
##    53     298       1    0.829 0.01900        0.793        0.867
##    54     296       2    0.823 0.01928        0.786        0.862
##    56     294       3    0.815 0.01968        0.777        0.854
##    57     291       1    0.812 0.01981        0.774        0.852
##    58     287       1    0.809 0.01995        0.771        0.849
##    59     283       1    0.806 0.02008        0.768        0.847
##    60     280       2    0.801 0.02035        0.762        0.842
##    61     277       2    0.795 0.02061        0.756        0.836
##    63     273       2    0.789 0.02086        0.749        0.831
##    65     270       1    0.786 0.02099        0.746        0.828
##    66     266       1    0.783 0.02112        0.743        0.826
##    67     265       3    0.774 0.02149        0.733        0.818
##    68     261       2    0.768 0.02173        0.727        0.812
##    69     258       2    0.762 0.02197        0.721        0.807
##    70     256       1    0.760 0.02208        0.717        0.804
##    71     254       4    0.748 0.02253        0.705        0.793
##    72     250       2    0.742 0.02274        0.698        0.788
##    73     247       3    0.733 0.02305        0.689        0.779
##    74     244       4    0.721 0.02344        0.676        0.768
##    77     237       1    0.718 0.02354        0.673        0.765
##    79     235       1    0.714 0.02364        0.670        0.762
##    81     232       1    0.711 0.02374        0.666        0.759
##    82     231       2    0.705 0.02393        0.660        0.754
##    83     229       3    0.696 0.02420        0.650        0.745
##    85     226       1    0.693 0.02429        0.647        0.742
##    86     224       1    0.690 0.02438        0.644        0.739
##    89     218       1    0.687 0.02447        0.640        0.736
##    90     215       3    0.677 0.02475        0.630        0.727
##    93     210       1    0.674 0.02484        0.627        0.724
##    96     206       2    0.667 0.02502        0.620        0.718
##    97     204       1    0.664 0.02511        0.617        0.715
##    98     203       1    0.661 0.02520        0.613        0.712
##   100     199       3    0.651 0.02547        0.603        0.703
```

```
##   101     195       2    0.644 0.02564        0.596        0.696
##   102     193       1    0.641 0.02572        0.592        0.693
##   104     189       1    0.637 0.02581        0.589        0.690
##   106     186       2    0.631 0.02598        0.582        0.684
##   107     184       1    0.627 0.02607        0.578        0.680
##   108     183       4    0.613 0.02638        0.564        0.667
##   109     179       1    0.610 0.02646        0.560        0.664
##   110     178       2    0.603 0.02660        0.553        0.658
##   111     174       4    0.589 0.02688        0.539        0.644
##   112     170       2    0.582 0.02700        0.532        0.638
##   113     168       3    0.572 0.02718        0.521        0.628
##   114     165       1    0.568 0.02724        0.518        0.624
##   115     164       2    0.562 0.02734        0.510        0.618
##   117     159       1    0.558 0.02740        0.507        0.614
##   118     157       3    0.547 0.02756        0.496        0.604
##   119     154       2    0.540 0.02765        0.489        0.597
##   120     152       2    0.533 0.02774        0.481        0.590
##   122     149       1    0.530 0.02779        0.478        0.587
##   123     147       1    0.526 0.02783        0.474        0.583
##   124     143       1    0.522 0.02788        0.470        0.580
##   125     142       1    0.519 0.02792        0.467        0.576
##   127     140       3    0.507 0.02805        0.455        0.566
##   128     137       2    0.500 0.02813        0.448        0.558
##   129     135       2    0.493 0.02819        0.440        0.551
##   130     133       1    0.489 0.02822        0.437        0.548
##   132     132       1    0.485 0.02825        0.433        0.544
##   135     129       1    0.481 0.02828        0.429        0.540
##   136     126       1    0.478 0.02832        0.425        0.537
```

The probability of surviving past 50 months in this sample is considerably high, around 80% people still survive, though the probability of surviving is decresing.