Lab A

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LAB A

1

Load Library

```
library(survival)
library(tidyverse)
```

```
## -- Attaching packages ---------------------------------------------------------------------------
## v ggplot2 3.2.1     v purrr   0.3.2
## v tibble  2.1.1     v dplyr   0.8.3
## v tidyr   1.0.0     v stringr 1.4.0
## v readr   1.3.1     v forcats 0.4.0
## -- Conflicts ------------------------------------------------------------------------------------
## x dplyr::filter() masks stats::filter()
## x dplyr::lag()    masks stats::lag()
```

Read the the data

```
vets <- read.table("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
```

In this case, v1 is vet.time and v2 is vet.cns

```
# create vectors
vet.time <- vets$V1
vet.cns <- vets$V2
vet.Surv <- Surv(vet.time, vet.cns)
# print vet.Surv
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
```

Calculate Mean of vet.time

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

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

According to the data provided, we know that it is biased because these are some censored values that affect the mean so that the mean of sampling distribution is not approriate.

More Calculatons

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

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

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

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

Interpretations: sum of vet.cns means there are 128 events occured and 9 censored, since for the censored portion, it will be added 0 each time. sum of vet.time*vet.cns is the sum of time (total days) that the events occured, since censored value will be multiplied by 0 every time.

Calculate mean of vet.surv

```
mean(vet.Surv)
```

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

This mean will not be affected by the censored values to obtain the true level of data, since it excludes the data of the censored and only includes the events happened.

2

Read the data

```
retire <- read.table("retire.txt", header=TRUE,skip=2)
```

In this case

```
# create vectors
ret.time <- retire$time
ret.death <- retire$death
ret.surv <- Surv(ret.time, ret.death)
ret.surv
```

```
##   [1] 137+  58+  56   26   22  137+  92+ 137+ 137+  68  137+ 137+ 127  105+
##  [15] 137+  65+   4+  80+  95+ 137+  26+  74+ 137+ 137+  19+ 123+ 137+ 137+
##  [29] 137+ 124   13   85+   2+  87+   8+ 137+ 137+  58+ 137+  26+ 137+  42+
##  [43] 135+ 137+ 137+ 137+ 137+   3+ 135+ 137+ 123+ 115+  59+   6+   7  137+
##  [57]   9+ 137+  40  137+ 137+  67   19+ 103+ 137+ 110+  30+  94+ 137+  98+
##  [71]  10   72   63   91+ 137+  40  111   11+  74  108  137+ 137+ 137+ 137+
##  [85]  98+ 137+  65+ 137+  86+ 137+ 137+  18  100+ 137+ 137+ 137+  20+ 123
##  [99]  52+ 137+  36   45+ 137+  46  137+ 103+  90  113   54  137+  56  137+
```

```
## [113]  17   41  115  137+ 135   38+ 137+ 137+ 113   95+  71  137+ 137+  44
## [127] 137+ 137+  67  136   82   53  137+ 137+  73   69   54  137+ 120  137+
## [141]   9   67+ 110+ 137+  83   87+ 137+  29+ 137+ 137+   2+ 137+  60+  53+
## [155]  73   41+   3+  74+   1  104   68+  24   81  108  137+  11  137+ 137+
## [169] 137+ 137+ 112  137+ 132+ 137+ 137+  33  137+  32+  37+ 137+ 137+ 113
## [183]  83  137+ 137+  76+ 118  127   70+ 137+  26+ 108  137+  57+  22  137+
## [197] 125    4+  18+  31  111   15  115+ 137+  41  137+ 137+  80+ 103+ 112
## [211] 117+ 120+ 137+  24+  33+ 137+ 101   96  137+  31+ 137+ 137+   7+ 137+
## [225]   8+ 137+ 137+  59  137+  12+  26+  36+ 117  122   16+  22  122+  15+
## [239] 137+  23  100  137+ 106   60  137+  88+  24+   5+ 110  137+  99+  27+
## [253] 137+  89+   4+ 137+  89   42  137+  31+ 137+   4+  98   96   12  114
## [267]  74  120   33+  72+ 137+ 119    5+  72  137+  49+ 137+  90   35+  35+
## [281]  36+ 137+ 111   61+  44+  62+  27+  74  137+  70   67   14    6   38
## [295]  46+  52+  57  107   12+  27+  89+ 137+  59+ 137+ 137+  13+   0+ 116+
## [309]  71   97  128  137+  35  137+ 126+  39   65+   3+ 128   35+ 137+  68
## [323]  43   51   39   82  100    3+   0+  85   50  137+  23+  64+  71   58+
## [337]  36+   7+  78+   0+ 137+   8+  37   35  100   22+ 129  105+ 137+ 132
## [351] 127    0+  71   50+  83   17+  13+  28+  87+   2+   4+  36   58   65
## [365] 123+ 137+  61   43  101   74    8   16  118   18   22  137+ 137+  22
## [379]  32+ 137+ 136+  41+ 111  137+  12+ 109   19   79    8+  32   27+  40+
## [393]  37+  61  133+  57+  37  137+ 137+  24+  35+  63   69   38   44  110
## [407]  86   57+  15+  18+  52   35+  46   19   77  137+   8+  90   11+  19
## [421]  48+   7+  12   36+  34+ 137+   2   34  102  118   18+  41    9  106
## [435] 137+ 108   73   39   28+ 115   45   31+  35+  34  137+  34+  47   93
## [449]  21    2    3+ 130   34  137+   8   31  137+ 129  119   66   56   60
```

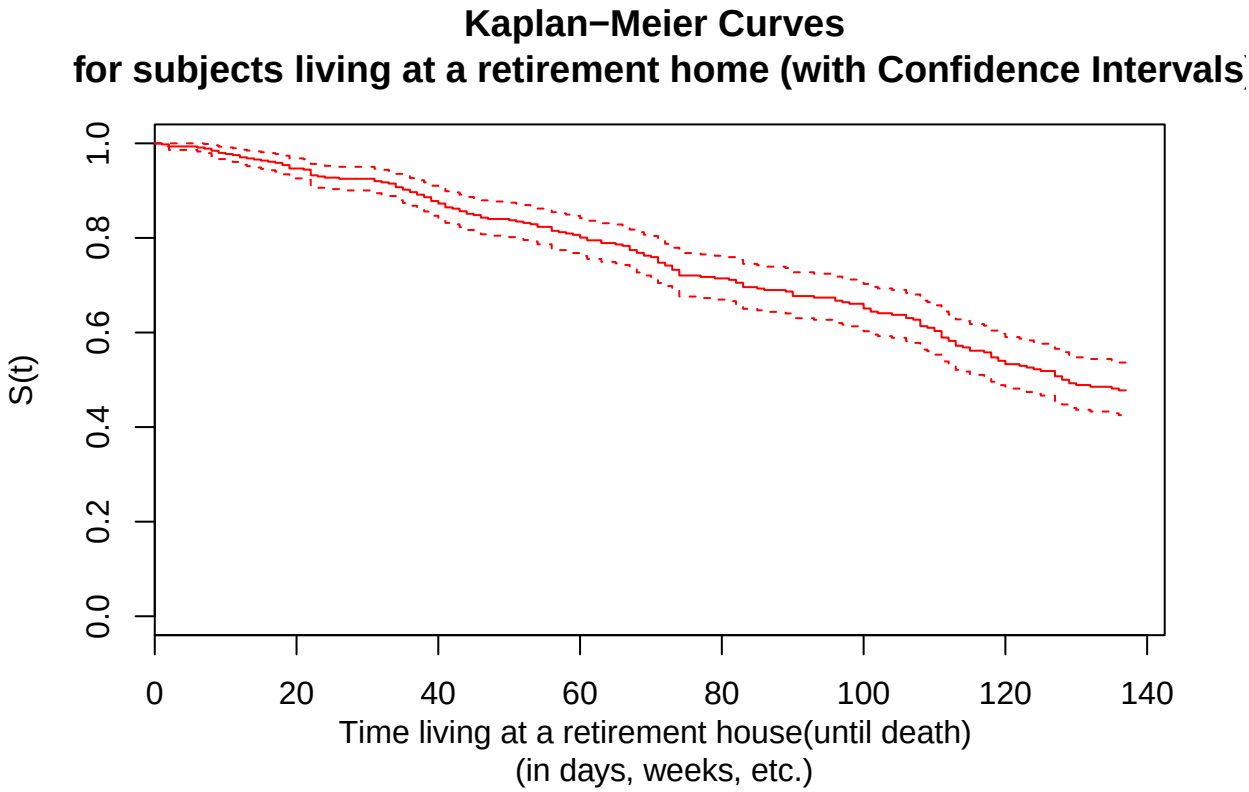
Kaplan–Meier estimate

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

```
## Call: survfit(formula = ret.surv ~ 1)
##
##       n  events  median 0.95LCL 0.95UCL
##     462     176     129     118      NA
```

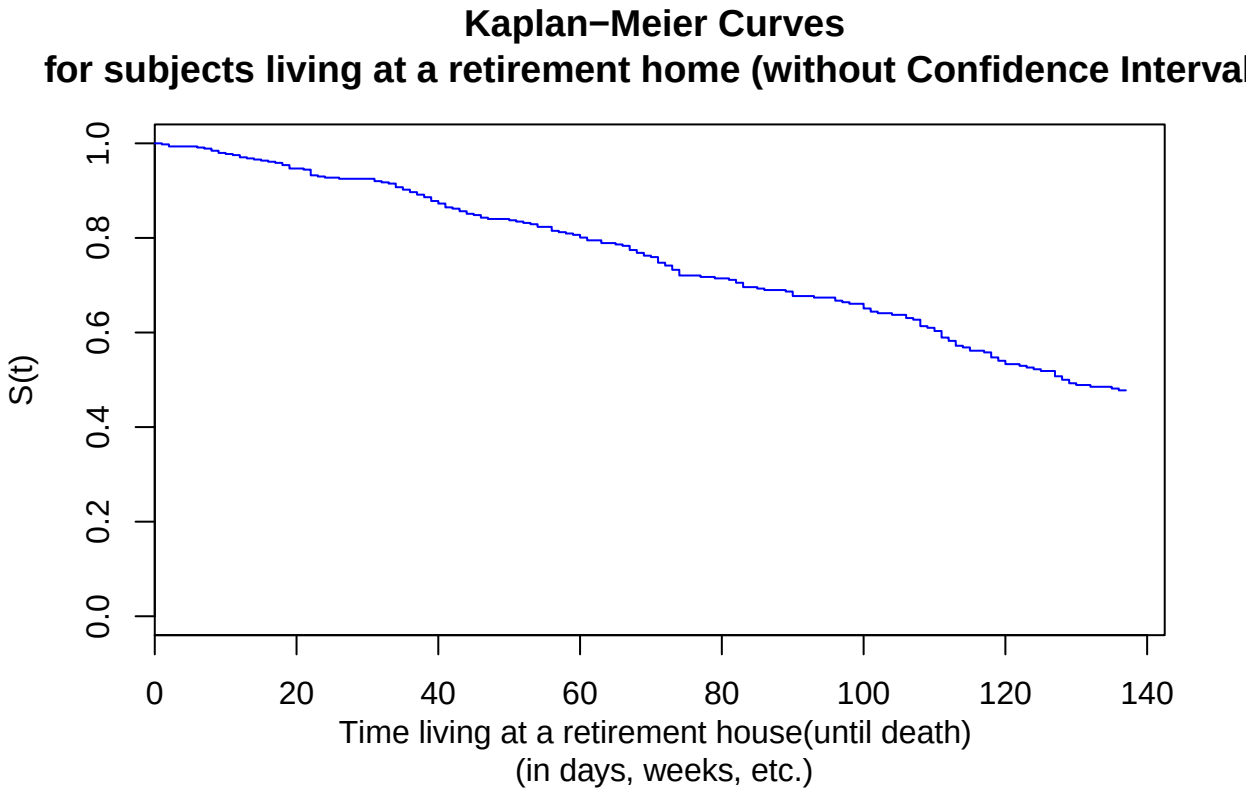
Get the Plot (with confidence Intervals)

```
plot(retire.fit,
main="Kaplan-Meier Curves \n for subjects living at a retirement home (with Confidence Intervals)",
xlab="Time living at a retirement house(until death) \n (in days, weeks, etc.)",
ylab="S(t)",
conf.int=T,
col="red")
```



Get the Plot (without confidence Intervals)

```
plot(retire.fit,
main="Kaplan-Meier Curves \n for subjects living at a retirement home (without Confidence Intervals)",
xlab="Time living at a retirement house(until death) \n (in days, weeks, etc.)",
ylab="S(t)",
conf.int=F,
col="blue")
```



Summary

```
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
```

Accordingly, there is 95% confidence in deciding the possibility of surviving past 50 month between 80.2% and 87.5% and the probability of surviving past 50 months in this sample is about 0.837.