Lista 2 - Análise de Sobrevivência

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Exercício 1

Item (a)

$P(T > 1) = 1 - P(T < 1) = 1 - \int_0^1 2t * exp\{-t^2\}dt = 1 - (1 - exp\{-1\}) \approx 0,3679$

Item (b)

$h(t) = \frac{f(t)}{S(t)} = \frac{2t*exp\{-t^2\}}{exp\{-t^2\}} \Rightarrow \lim_{t\to\infty} h(t) = \infty$

Exercício 2

```
##       tempos.ex2 censuras.ex2
##  [1,]          7            0
##  [2,]         34            0
##  [3,]         42            0
##  [4,]         63            0
##  [5,]         64            0
##  [6,]         74            1
##  [7,]         83            0
##  [8,]         84            0
##  [9,]         91            0
## [10,]        108            0
## [11,]        112            0
## [12,]        129            0
## [13,]        133            0
## [14,]        133            0
## [15,]        139            0
## [16,]        140            0
## [17,]        140            0
## [18,]        146            0
## [19,]        149            0
## [20,]        154            0
## [21,]        157            0
## [22,]        160            0
## [23,]        160            0
## [24,]        165            0
## [25,]        173            0
## [26,]        176            0
## [27,]        185            1
## [28,]        218            0
## [29,]        225            0
## [30,]        241            0
## [31,]        248            0
## [32,]        273            0
```

```
## [33,]        279            1
## [34,]        297            0
## [35,]        319            1
## [36,]        405            0
## [37,]        417            0
## [38,]        420            0
## [39,]        440            0
## [40,]        523            0
## [41,]        523            1
## [42,]        583            0
## [43,]        594            0
## [44,]       1101            0
## [45,]       1116            1
## [46,]       1146            0
## [47,]       1226            1
## [48,]       1349            1
## [49,]       1412            1
## [50,]       1417            0
```

Item (a)

```
require(survival)
```

```
## Loading required package: survival
```

```
KM.ex2 <-
survfit(Surv(time = tempos.ex2, event = censuras.ex2) ~ 1, conf.int = F)
NA.ex2 <-
survfit(coxph(Surv(tempos.ex2, censuras.ex2) ~ 1, method = "breslow"))
summary(KM.ex2)
```

```
## Call: survfit(formula = Surv(time = tempos.ex2, event = censuras.ex2) ~
##     1, conf.int = F)
##
##  time n.risk n.event survival std.err
##    74     45       1    0.978  0.0220
##   185     24       1    0.937  0.0451
##   279     18       1    0.885  0.0661
##   319     16       1    0.830  0.0819
##   523     11       1    0.754  0.1035
##  1116      6       1    0.629  0.1436
##  1226      4       1    0.471  0.1735
##  1349      3       1    0.314  0.1728
##  1412      2       1    0.157  0.1407
```

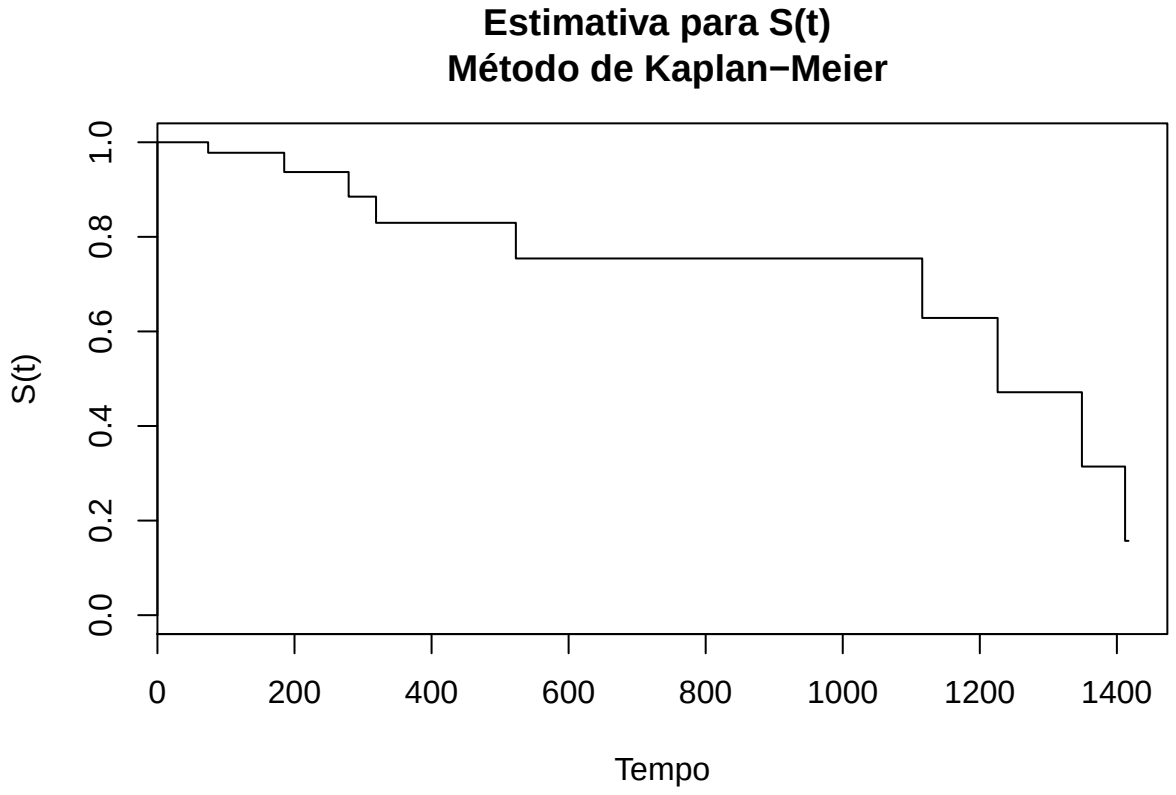
```
summary(NA.ex2)
```

```
## Call: survfit(formula = coxph(Surv(tempos.ex2, censuras.ex2) ~ 1, method = "breslow"))
##
##  time n.risk n.event survival std.err lower 95% CI upper 95% CI
##    74     45       1    0.978  0.0217        0.936        1.000
##   185     24       1    0.938  0.0443        0.855        1.000
##   279     18       1    0.887  0.0647        0.769        1.000
##   319     16       1    0.834  0.0801        0.691        1.000
```

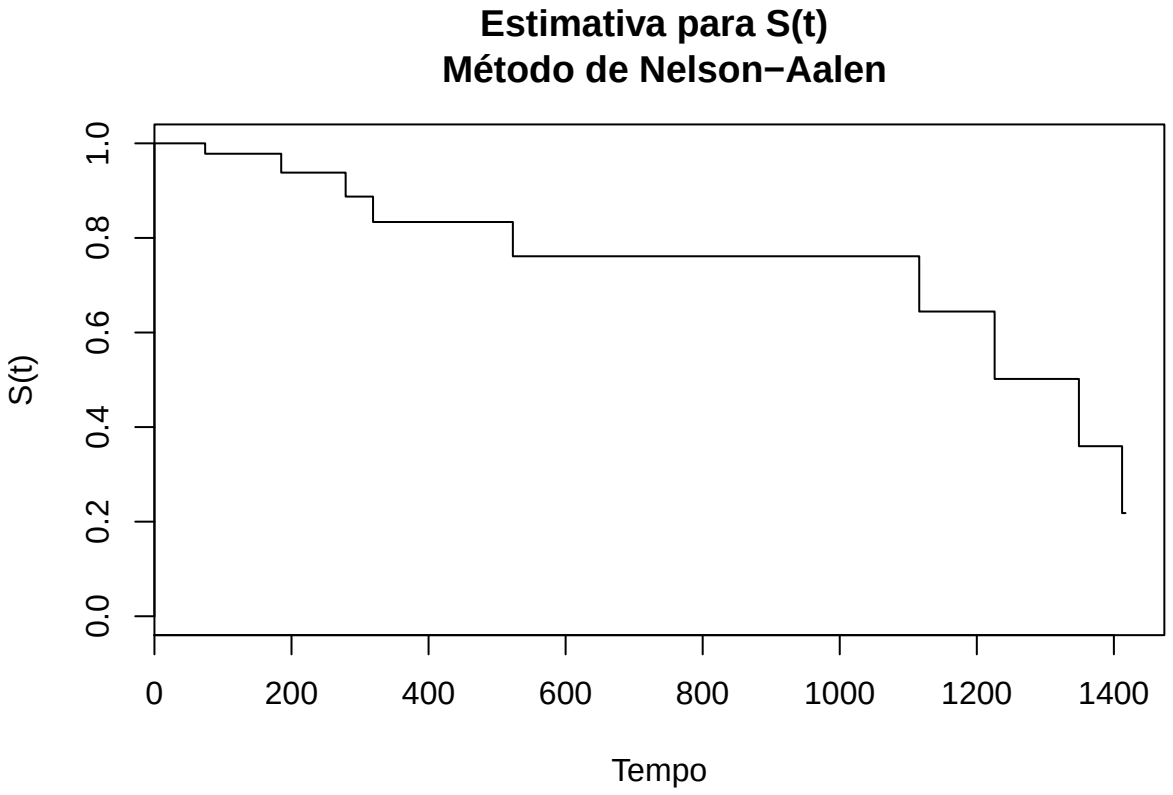
```
##   523     11       1    0.761  0.1007        0.587        0.986
##  1116      6       1    0.644  0.1371        0.425        0.978
##  1226      4       1    0.502  0.1647        0.264        0.955
##  1349      3       1    0.360  0.1682        0.144        0.900
##  1412      2       1    0.218  0.1493        0.057        0.835
```

Item (b)

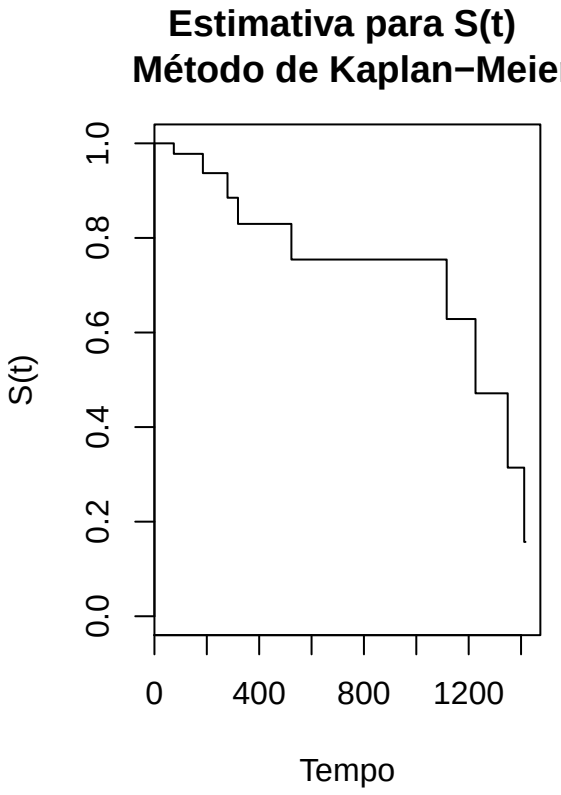
```
plot(
KM.ex2,
conf.int = FALSE,
xlab = "Tempo",
ylab = "S(t)",
main = "Estimativa para S(t) \n Método de Kaplan-Meier"
)
```

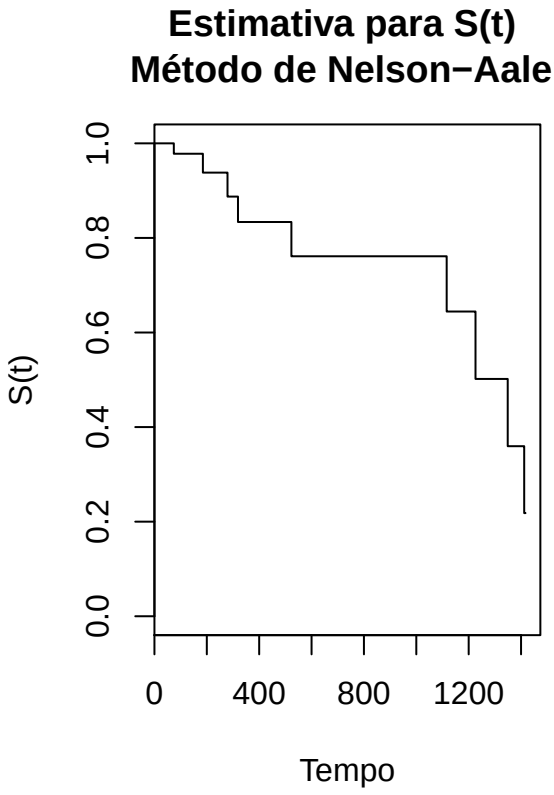



```
plot(
NA.ex2,
conf.int = FALSE,
xlab = "Tempo",
ylab = "S(t)",
main = "Estimativa para S(t) \n Método de Nelson-Aalen"
)
```

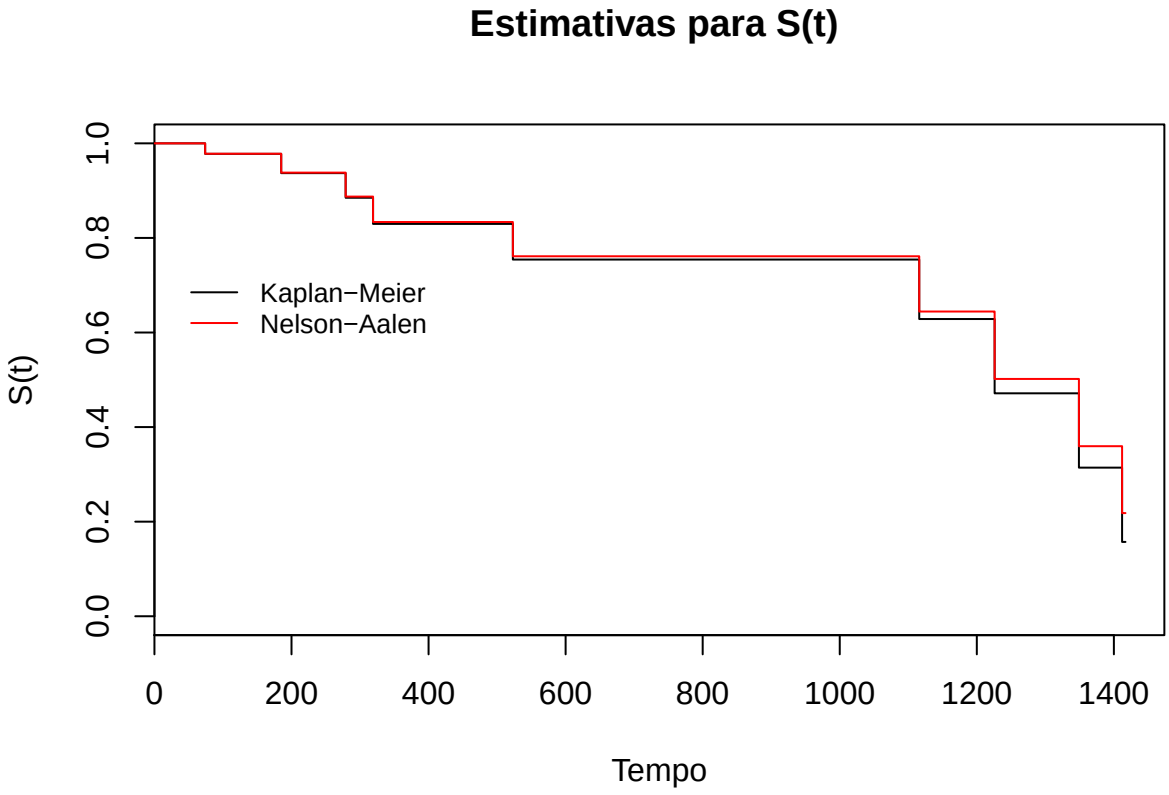



```
par(mfrow=c(1,2))
plot(
KM.ex2,
conf.int = FALSE,
xlab = "Tempo",
ylab = "S(t)",
main = "Estimativa para S(t) \n Método de Kaplan-Meier"
)
plot(
NA.ex2,
conf.int = FALSE,
xlab = "Tempo",
ylab = "S(t)",
main = "Estimativa para S(t) \n Método de Nelson-Aalen"
)
```

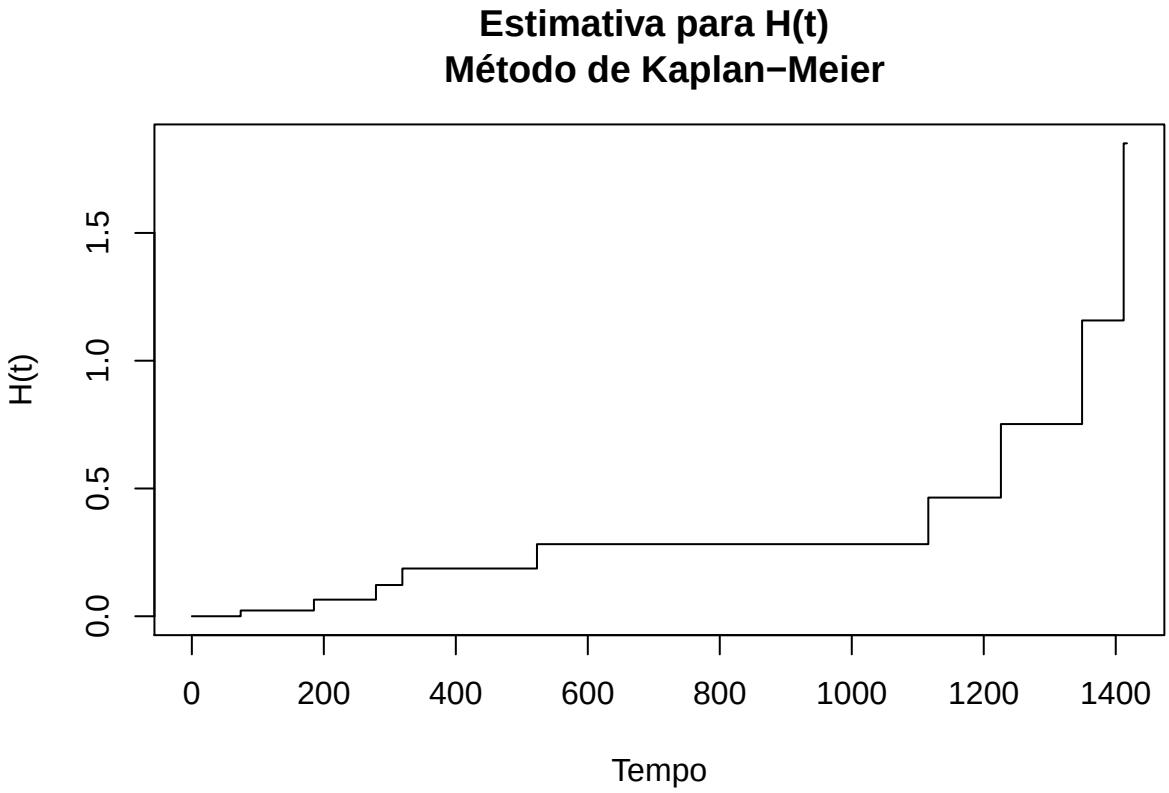




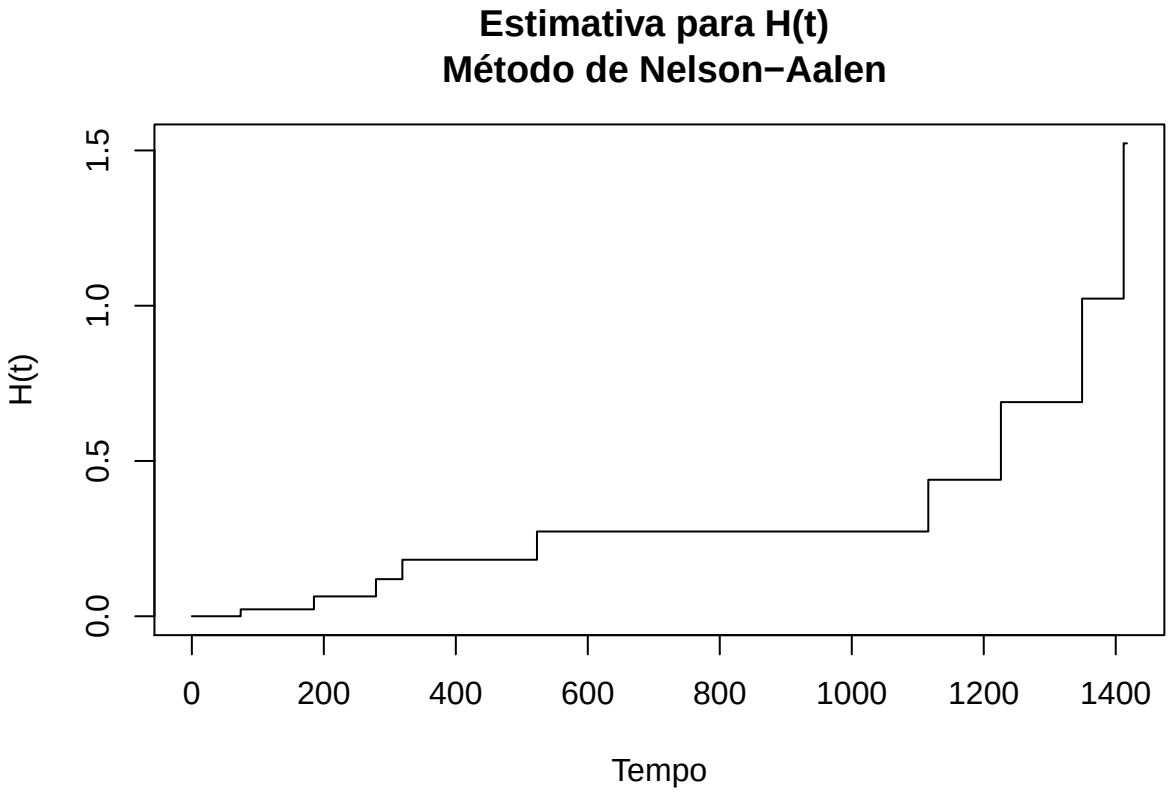

```r
par(mfrow = c(1,1))
plot(
KM.ex2,
conf.int = FALSE,
xlab = "Tempo",
ylab = "S(t)",
main = "Estimativas para S(t) \n "
)
lines(NA.ex2, col = 2, conf.int = F)
legend(20,0.75,lty=c(1,1),c("Kaplan-Meier","Nelson-Aalen"),bty="n",cex=0.8,col=c(1,2))
```



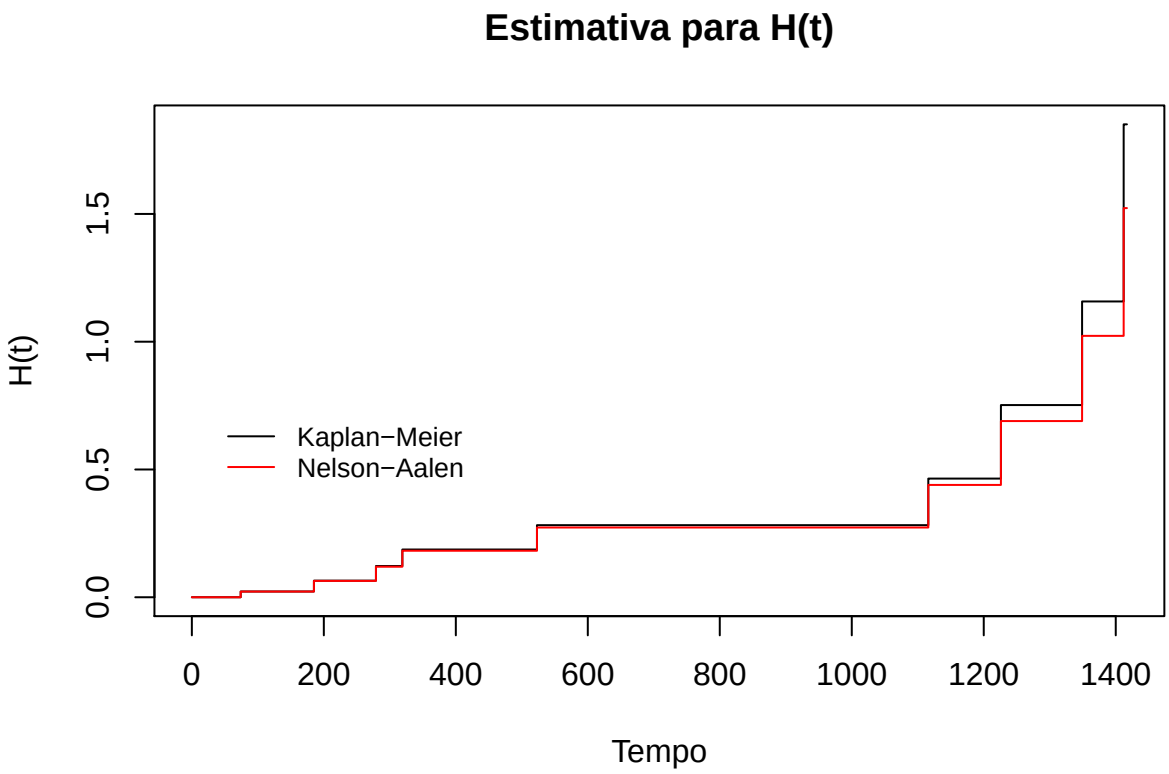

```
plot(KM.ex2, fun = "cumhaz", xlab = "Tempo", ylab = "H(t)", main = "Estimativa para H(t) \n Método de Ka
```




```
plot(NA.ex2, conf.int = F, fun = "cumhaz", xlab = "Tempo", ylab = "H(t)", main = "Estimativa para H(t) \
```




```
plot(KM.ex2, fun = "cumhaz", xlab = "Tempo", ylab = "H(t)", main = "Estimativa para H(t)")
lines(NA.ex2, col =2, fun = "cumhaz", conf.int = F)
legend(20,0.75,lty=c(1,1),c("Kaplan-Meier","Nelson-Aalen"),bty="n",cex=0.8,col=c(1,2))
```


Estimativa para H(t)
H(t)
0.0
0.5
1.0
1.5
Kaplan−Meier
Nelson−Aalen
0
200
400
600
800
1000
1200
1400
Tempo

Item (c)