Rotterdam

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Contents

Chapter 1

Motivation

According to World Health Organization∗, Cancer is a leading cause of death worldwide, accounting for an estimated 9.6 million deaths in 2018. And amongst all cancer types, breast cancer(along with lung cancer) has the top cases of death: 2.09 million cases in 2018. According to the CDC∗, Breast cancer is also the second most common cancer among women in the United States, comprising 22.9% of invasive cancers in women and 16% of all female cancers. However, because of the cancer's characteristics, breast cancer patients have relatively high 5-year survival rate of 85% compared to other more lethal cancers according to research conducted in the UK∗. We think it is worthwhile to look at the relationship between survival/recurrence time and some diagnostic criterion of breast cancer. We are also going to explore the effect of different treatments on survival/recurrence.

1.1   Some Background Information

For doctors to be able to assess the severity and different types of breast cancer, researchers have come up with a diagnosing system called the TNM∗ Staging system that is widely used in the diagnostics of breast cancer:

Tumor(T): How large is the primary tumor in the breast?

Node (N): Has the tumor spread to the lymph nodes? If so, where, what size, and how many?

Metastasis (M): Has the cancer spread to other parts of the body?

Generally, the results from the above three features are combined to form a diagnosis of a total of 5 stages of breast cancer: stage 0 (zero), which is non-invasive ductal carcinoma in situ (DCIS), and stages I through IV (1 through 4), which are used for invasive breast cancer.

We will be using data related to this system to conduct our exploration.

Chapter 2

Data Exploration

2.1 Loading Data

```
data(rotterdam)
```

The data that we are going to use is called `rotterdam`, and it is a dataset that's pre-recorded in the survival package. According to the documentation of the package, the data are retrieved from the Rotterdam tumor bank, which include various anonymous information about patients with breast cancer. Below is a table of the variables in the dataset:

Variable name	Description
pid	patient identifier
year	year of cancer incidence
age	age
meno	menopausal status (0= premenopausal, 1= postmenopausal)
size	tumor size, a factor with levels `<=20`, `20-50`, `>50`
grade	tumor grade
nodes	number of positive lymph nodes
pgr	progesterone receptors (fmol/l)
er	estrogen receptors (fmol/l)
hormon	hormonal treatment (0=no, 1=yes)
chemo	chemotherapy
rtime	days to recurrence or last follow-up
recur	0= no recurrence, 1= recurrence
dtime	days to death or last follow-up
death	0= alive, 1= dead

From the description above, we see that there are `size` which stands for the size of the tumor, `nodes` which stands for how many lymph nodes are test cancer positive, so we have 2 criterions out of the three suggested in the background info.

2.2   Data Wrangling

2.2.1   T(Tumor)N(Node)M(Metastasis)

```r
rotterdam %>%
  group_by(size) %>%
  summarise(number = n(), .groups = 'drop')
```

```
## # A tibble: 3 x 2
##   size   number
##   <fct>  <int>
## 1 <=20    1387
## 2 20-50   1291
## 3 >50      304
```

The number of lymph nodes tested positive is a important measure in the TNM system. However, right now the `nodes` variable in our dataset is numeric and makes it hard for us to make visualization. For visualization purpose, we will make a new categorical variable called `Nodes_level`. For lymph nodes tested positive, the usual medical way of classifying the severity would be:`N0` for no positive nodes; `N1` for 1-3 positive nodes; `N2` for 4-9 positive nodes; and `N3` for more than 10 nodes. We will follow this classification method.

```r
rotterdam <- rotterdam %>%
  mutate(Nodes_level = ifelse(nodes == 0, "N0",
                        ifelse(nodes >= 1 & nodes <= 3, "N1",
                        ifelse(nodes >= 4 & nodes <= 9, "N2",
                        ifelse(nodes >= 10, "N3", NaN)))))
rotterdam %>%
  group_by(Nodes_level) %>%
  summarise(number = n(), .groups = 'drop')
```

```
## # A tibble: 4 x 2
##   Nodes_level number
##   <chr>       <int>
## 1 N0           1436
```

```
## 2 N1              764
## 3 N2              515
## 4 N3              267
```

Since the `grade` variable in our dataset is a numeric variable whereas we actually want to treat it as a factor, we do the following:

```
rotterdam <- rotterdam %>%
  mutate(grade = as.factor(grade))
```

```
rotterdam %>%
  group_by(grade) %>%
  summarise(number = n(), .groups = 'drop')
```

```
## # A tibble: 2 x 2
##   grade number
##   <fct>  <int>
## 1 2        794
## 2 3       2188
```

In our dataset, we could see that all of the breast cancer patients are located at stage II or stage III breast cancer, which means that the cancer has not started shifting to other parts of the body, which makes the recordance of metastasis information to be impossible. As we will continue using the TNM system mentioned in the previous chapter to conduct our research, we won't be able to measure statistics related to metastasis.

2.2.2 Treatment

As we were examining through the data, we found that upon the `chemo` variable and the `hormon` variable, there are instances where patients gets both therapy or neither. So in order to explore the relationship between treatment and survival, we introduce a new variable called `Treatment`, using the `chemo` and `hormon` variables.

```
rotterdam <- rotterdam %>%
  mutate(Treatment = ifelse(chemo == 1 & hormon == 0, "Chemo",
                     ifelse(chemo == 0 & hormon == 1, "Hormon",
                     ifelse(chemo == 1 & hormon == 1, "Both", "NaN/Other Treatment")))) %>%
  mutate(Treatment = as.factor(Treatment))
```

Note that in this manner as we try to 'merge' two binary variables into one variable with four levels, we are assuming interaction between `chemo` and `hormon`.

```
rotterdam_recur <- rotterdam %>%
  filter(recur == 1) %>%
  mutate(drecurtime = dtime-rtime)
nrow(rotterdam_recur)
```

```
## [1] 1518
```

We also thought it would be of interest to invesigate how recurrnce of tumor might affect the survival of the patient. We made a new dataset called `rotterdam_recur`, which only include patients with `recur` $= 1$. Now the dataset contains 1518 data points, a little over the original `rotterdam` dataset. We will label the time from recurrence to death as `drecurtime` in the new data frame.

2.3   Data visualizations and exploration

2.3.1   Diagnostics vs. Survival Times

It is commonly considered that the earlier the breast cancer is detected and the earlier it is treated, the longer survival a patient might enjoy. Thus we think it is important to first look at the diagnostics before treatment and visualize their relationship with survival times.

`size` vs. `dtime`

```
ggplot(data = rotterdam, aes(x = size, y = dtime, fill = size)) +
  geom_violin(alpha = 0.5)
```
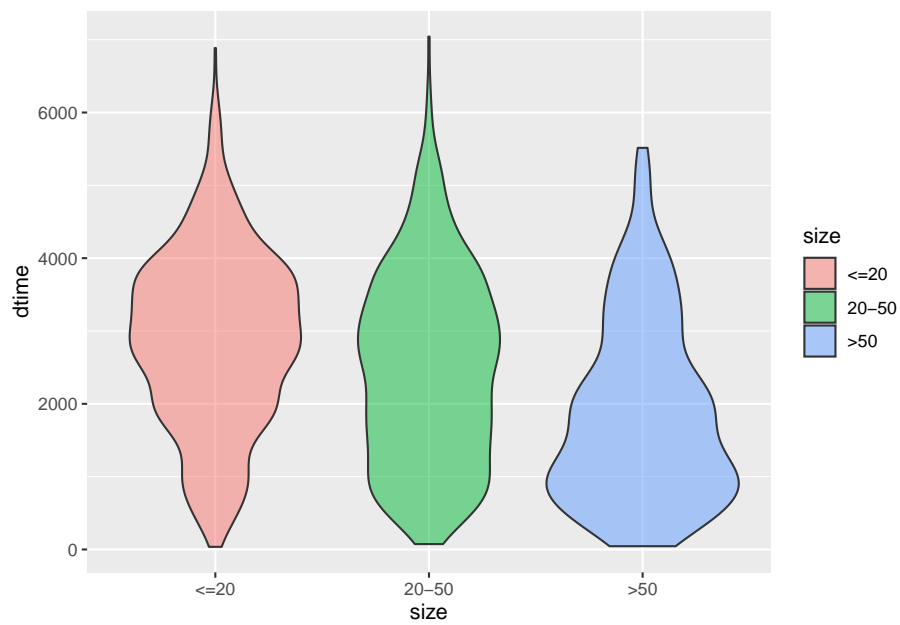
`size` vs. `rtime`

```
ggplot(data = rotterdam, aes(x = size, y = rtime, fill = size)) +
  geom_violin(alpha = 0.5)
```
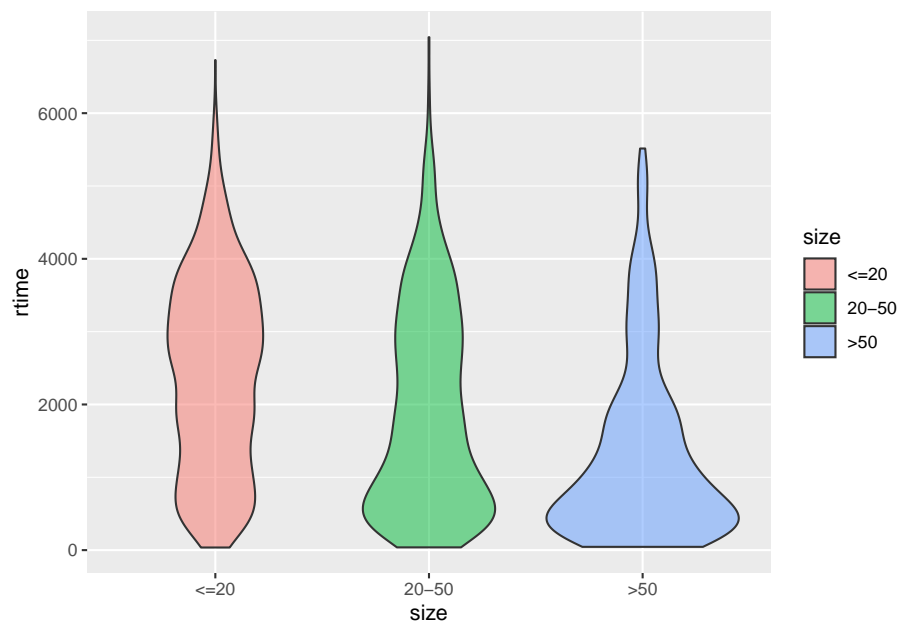
`size` vs. `drecurtime`

```
ggplot(data = rotterdam_recur, aes(x = size, y = drecurtime, fill = size)) +
  geom_violin(alpha = 0.5)
```
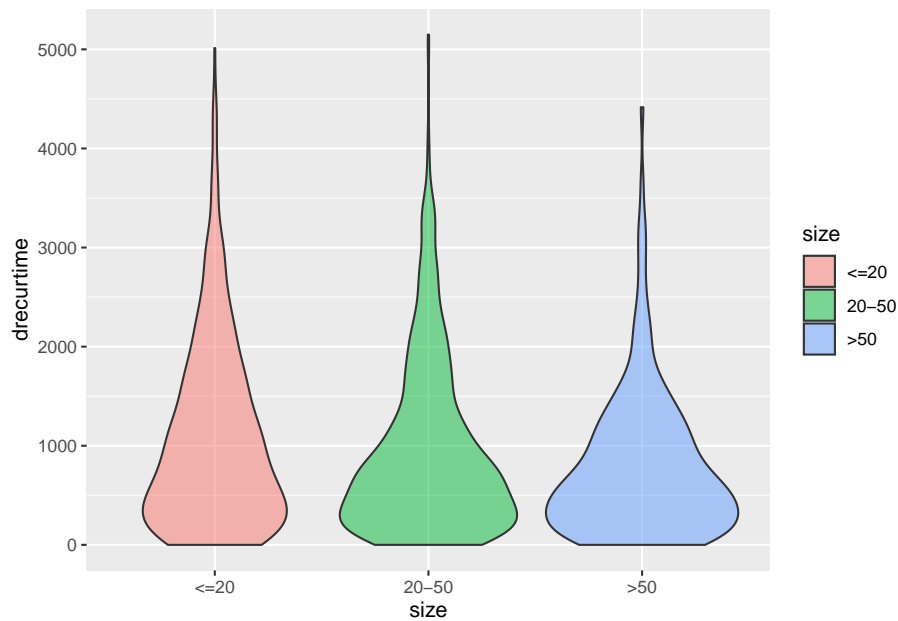

As we can see from the three plots above, tumor size could be an important factor that affects patients' survival time and recur time. For `size` smaller than 20, most of the patients are able to survive or encounter recurrence after roughly 3000 days. But for `size` 20-50 and >50, it's highly likely for cancer cells to recur in 500 days. However, after cancer cells have recurred, most patients could not survive over 2 years.

`Nodes_level` vs. `dtime`

```
ggplot(data = rotterdam, aes(x = Nodes_level, y = dtime, fill = Nodes_level)) +
  geom_violin(alpha = 0.5)
```
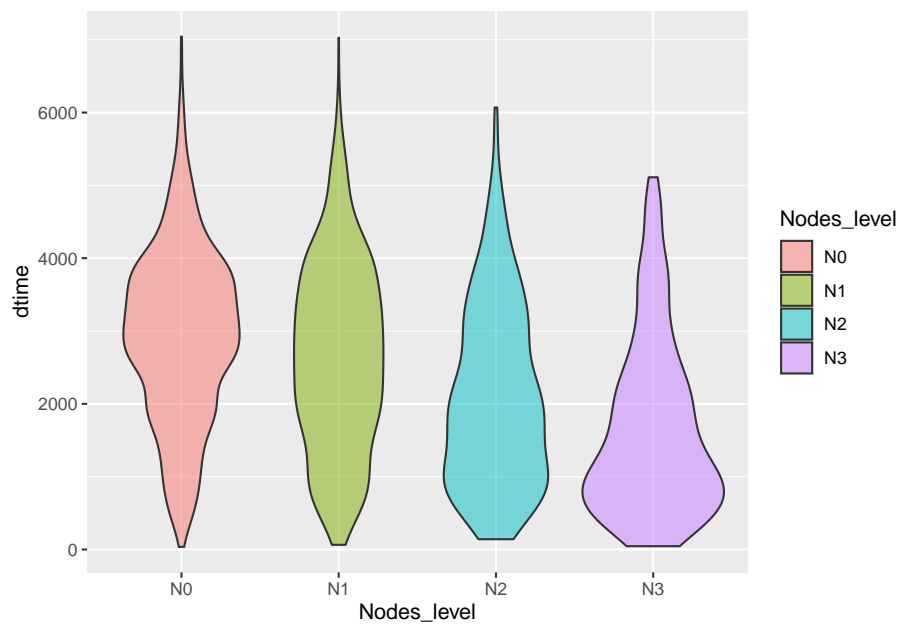
Nodes_level vs. rtime

```
ggplot(data = rotterdam, aes(x = Nodes_level, y = rtime, fill = Nodes_level)) +
  geom_violin(alpha = 0.5)
```
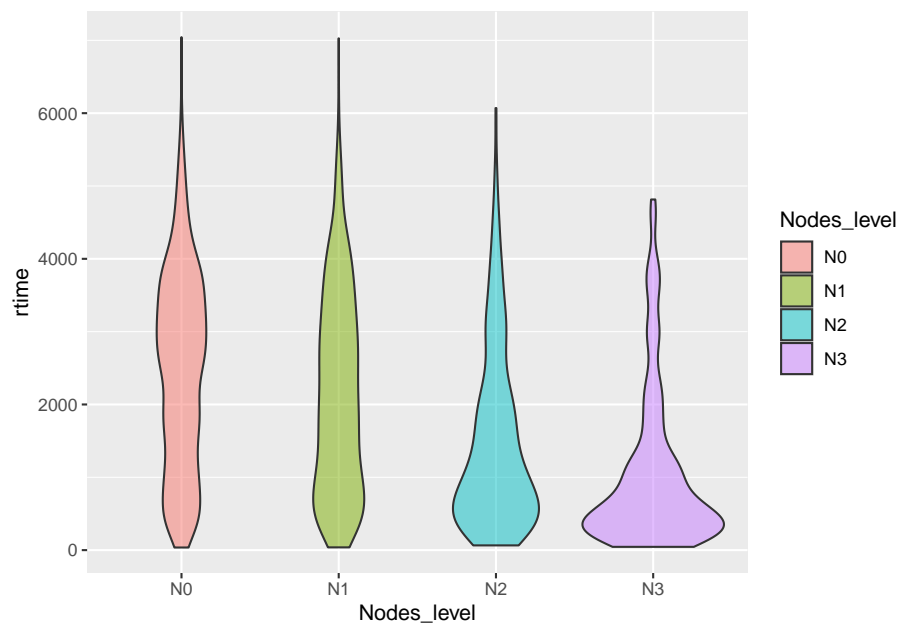
`Nodes_level` vs. `drecurtime`

```
ggplot(data = rotterdam_recur, aes(x = Nodes_level, y = drecurtime, fill = Nodes_level
  geom_violin(alpha = 0.5)
```
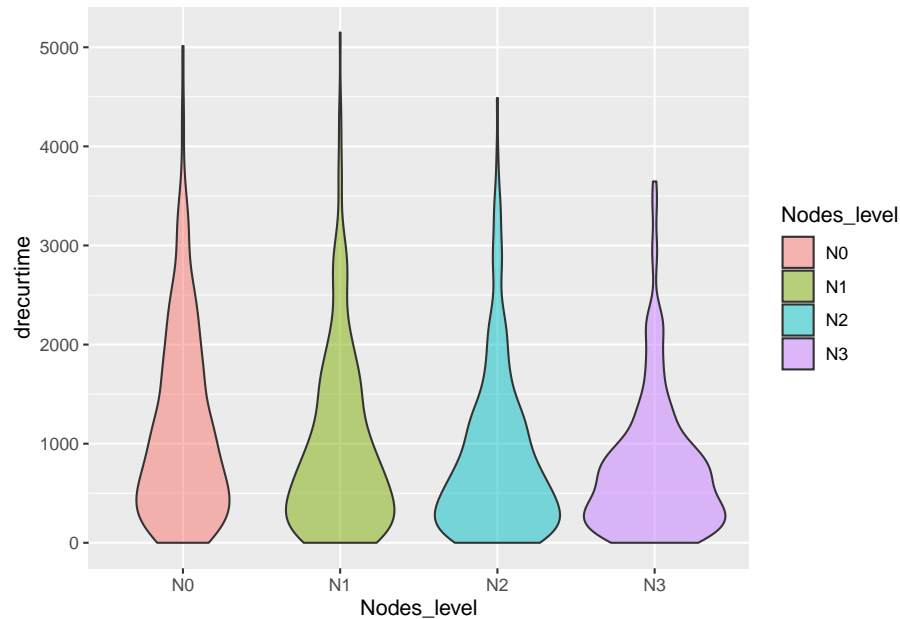

Similarly, `nodes` is also a factor impacting the life of breast cancer patients. In fact, for patients with high `Nodes_level`, it is typically considered they are either having metastasis of the cancer or already experiencing a regional recurrence of the cancer. Thus, we could see that most patients with N2 or N3 `Nodes_level` experience recurrence shortly after treatment. However, after tumor has recurred, most patients could not survive over 2 years.

2.3.2   Treatment vs. Survival Times

Next we are also going to look at the effect of different types of treatments on the survival times of breast cancer patients.

`Treatment` vs. `dtime`

```
ggplot(data = rotterdam, aes(x = Treatment, y = dtime, fill = Treatment)) +
  geom_violin(alpha = 0.5)
```
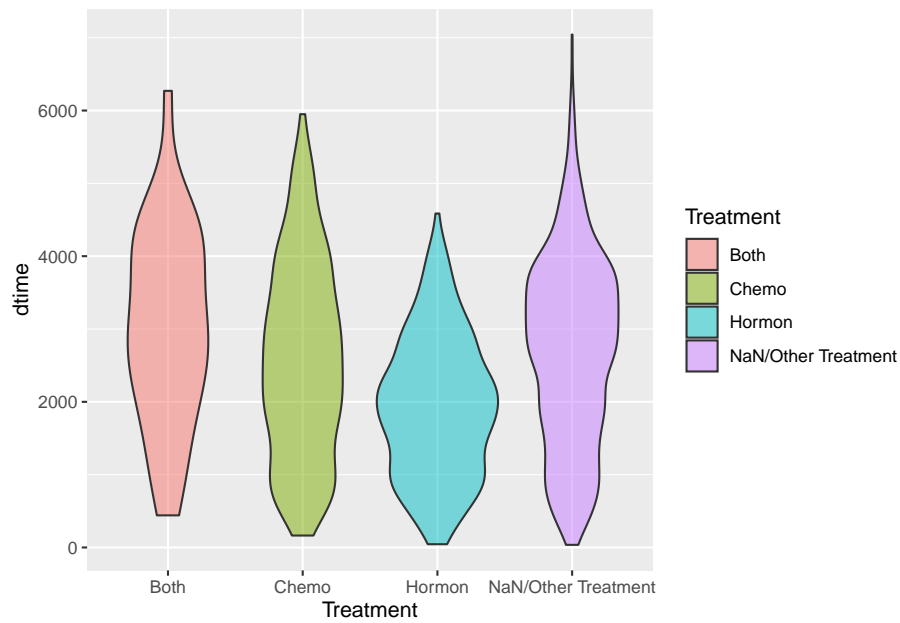
Treatment vs. `rtime`

```
ggplot(data = rotterdam, aes(x = Treatment, y = rtime, fill = Treatment)) +
  geom_violin(alpha = 0.5)
```
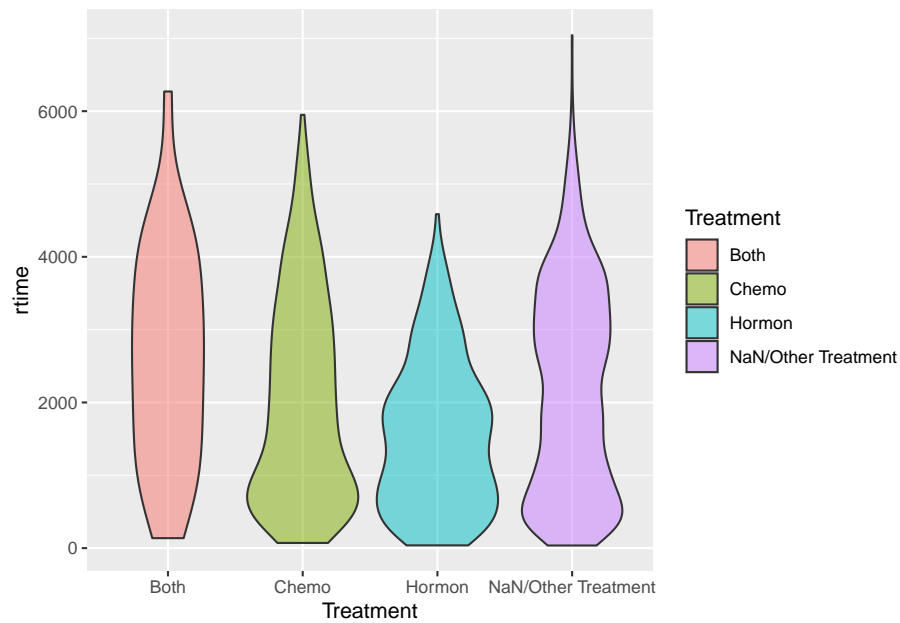
Treatment vs. `drecurtime`

```
ggplot(data = rotterdam_recur, aes(x = Treatment, y = drecurtime, fill = Treatment)) +
  geom_violin(alpha = 0.5)
```
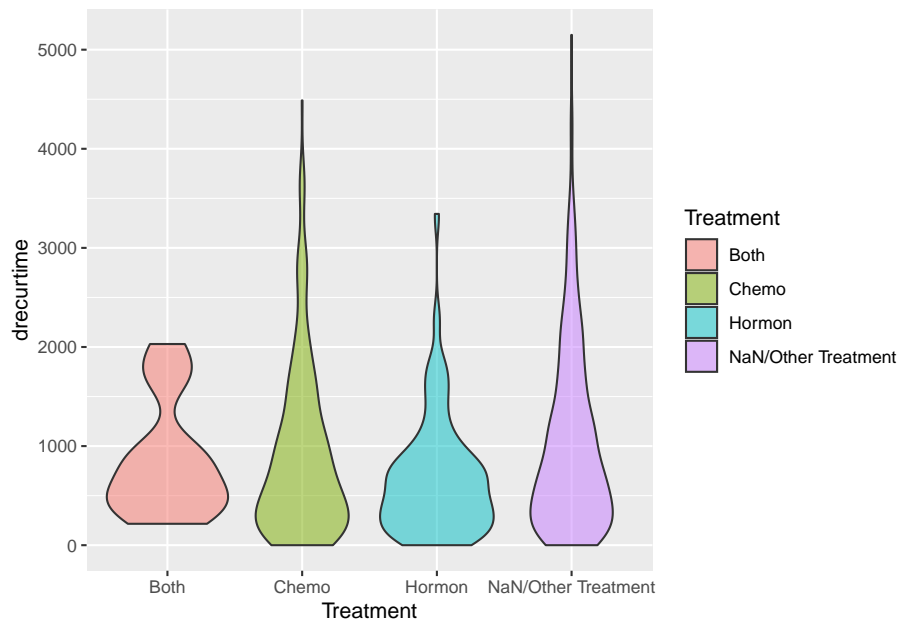

By examing the three plots above, it seems that `Treatment` would not affect patients survival time or recurrence that much. We can find that `chemo + hormon` is likely to be the one with best curative effect, that patients receiving both chemo and hormon therapy tend to have longer survival time and longer time to recurrence. And the effect of hormon therapy itself seems not that satisfying. However, after tumor have recurred, most patients do not live up to 2 years.

We also found a bi-model shape in `NaN/Other Traetment` group in `rtime` vs. `Treatment`. This may because the two peaks correponds to no treatment and other treatment separately, but currently we don't have more information investigating the true reason.

2.3.3   `age` + Treatment vs. Survival Times

`age` + Treatment vs. `dtime`

As we were visualizing for `Treatment` vs. `dtime`, we found that Hormontherapy generally has a weaker effect than Chemotherapy, but we think there might be some confounding variables that leads to such conclusion. One that we discovered is `age`:

```r
ggplot(data = rotterdam, aes(x = age, y = dtime, color = Treatment)) +
  geom_point(alpha = 0.5)
```
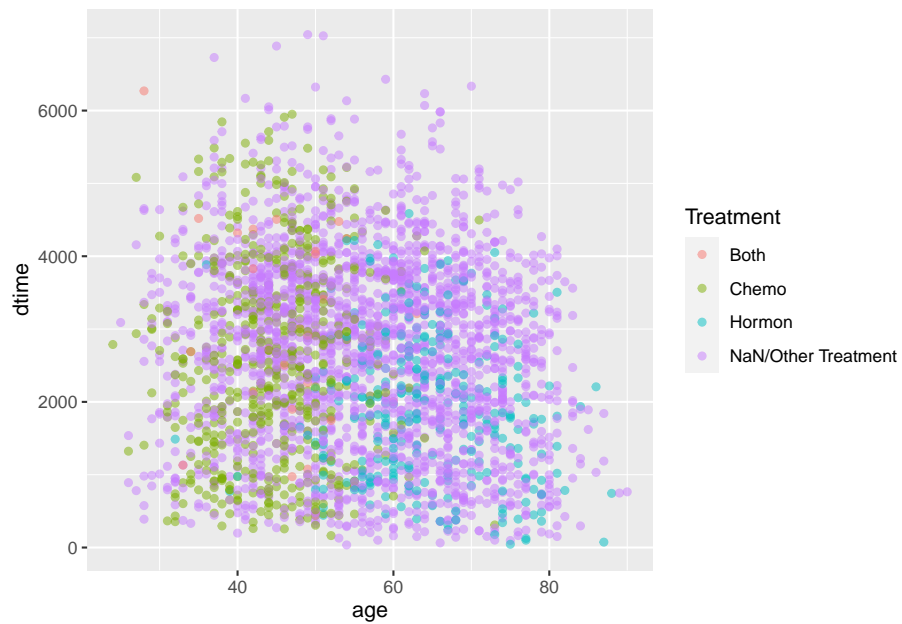

age + Treatment vs. rtime

```r
ggplot(data = rotterdam, aes(x = age, y = rtime, color = Treatment)) +
  geom_point(alpha = 0.5)
```
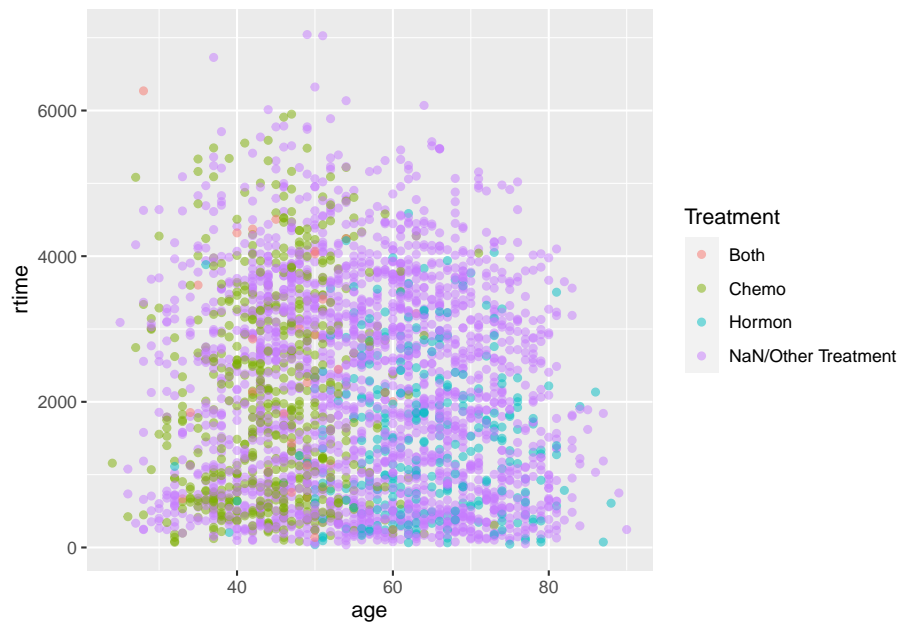
It might be different to see from the plots right now, so we decided to make a partial plot of the full plot by filtering the patients who did not take either treatment out.

```
rotterdam_new <-rotterdam %>%
  filter(Treatment != "NaN/Other Treatment") %>%
  filter(Treatment != "Both")
```

age + Treatment vs. dtime

```
ggplot(data = rotterdam_new, aes(x = age, y = dtime, color = Treatment)) +
  geom_point(alpha = 0.5)
```

age + Treatment vs. rtime

```
ggplot(data = rotterdam_new, aes(x = age, y = rtime, color = Treatment)) +
  geom_point(alpha = 0.5)
```
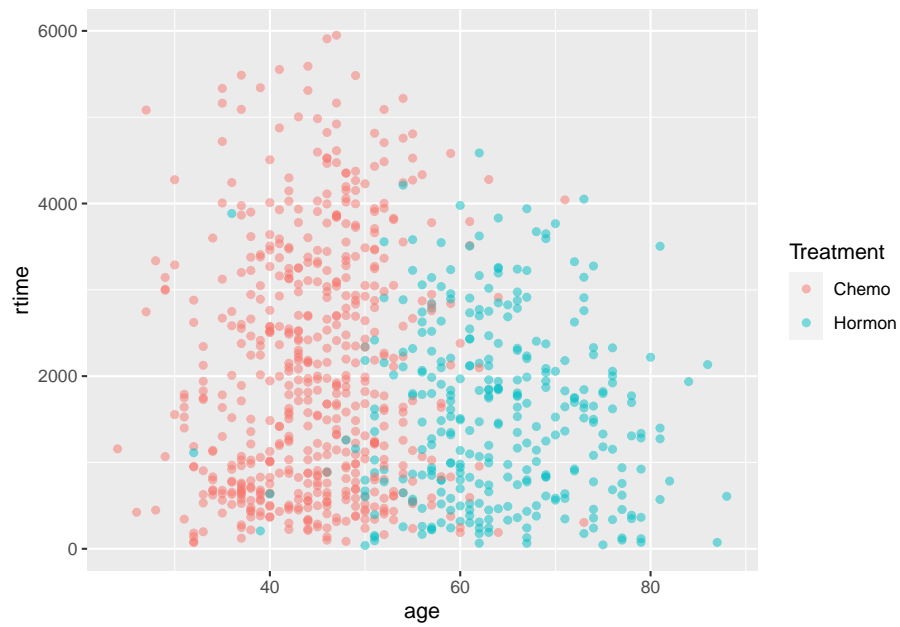
From the two plots above we could see that the patients who took either chemo therapy or hormon therapy are clearly clusterd. For the group who only took chemotherapy, most patients' `age` are located below 50 years old. For the group who only took hormontherapy, most patients' age are located above 50 years old. This is because chemotherapy might have more negative effects for patients at larger age than hormontherapy and thus would effect survival if the wrong therapy is given. Generally, hormontherapy is more friendly to elder people but chemotherapy has better effect.

2.3.4   Treatment vs. TNM

Treatment vs. `size`

```
ggplot(data = rotterdam, aes(x = Treatment, fill = size)) +
  geom_bar(position = "stack")
```
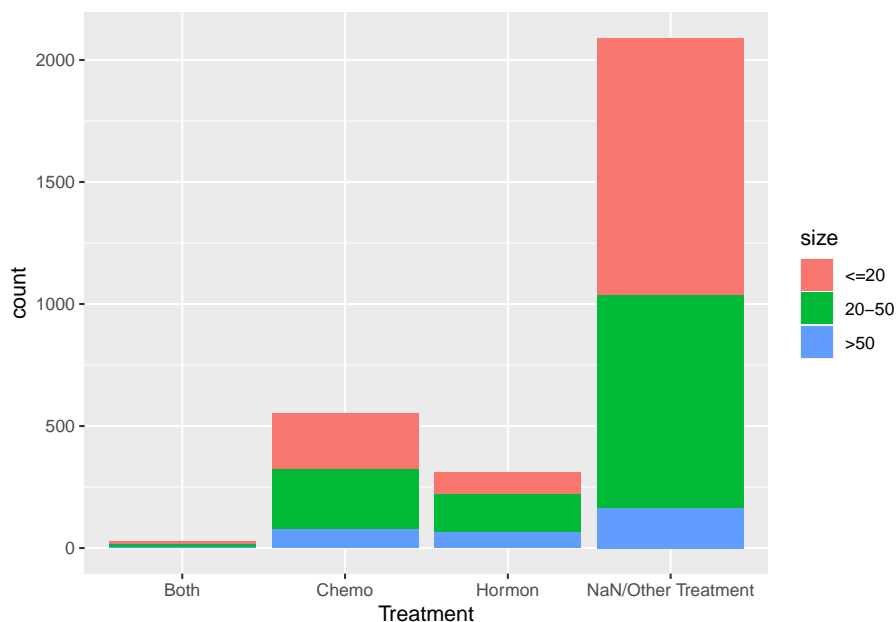

We are also interested to see if there are any other factors that would affect a patient's decision on the treatment he/she takes other than his/her age. We thought we could stick with the TNM system and we started with tumor size. Generally, there is no distinction in the treatment taken among different sizes of tumor as we can see from the plot above.

Treatment vs. `Nodes_level`

```
ggplot(data = rotterdam, aes(x = Treatment, fill = Nodes_level)) +
  geom_bar(position = "stack")
```
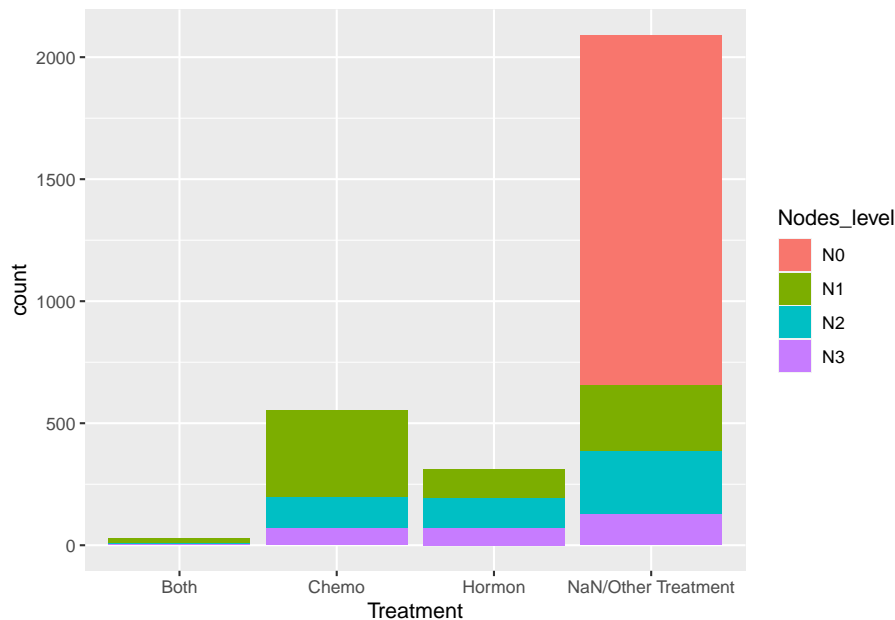

This time we are checking if there are difference in `Treatment` with respect to different positive lymph node levels. Now we are onto something interesting. We can see that none of the `N0` patients in our dataset have taken either chemotherapy or hormontherapy. we think that it is possible that chemotherapy and hormontherapy are for severer patients and they might just be "overkill" for mild patients.

2.3.5 General X-year Survival Rate

A very important criterion in analysis about cancer is the 5-year survival rate. In order to examine that, we introduce a new variable called `5_year_survival`, which indicates 1 if a patients survival time is larger than 5 years and 0 vice versa.

```
rotterdam <- rotterdam %>%
  mutate(dtime_Years = floor(dtime/365)) %>%
  mutate('5_year_survival' = ifelse(dtime_Years >= 5, 1, 0))
```

Now we want to calculate the 5-year survival rate for the population in the dataset.

```r
rotterdam %>%
  group_by('5_year_survival') %>%
  summarise(number = n(), .groups = 'drop')
```

```
## # A tibble: 2 x 2
##   '5_year_survival' number
##               <dbl>  <int>
## 1                 0    898
## 2                 1   2084
```

```r
2084/(898+2084)
```

```
## [1] 0.6988598
```

And also the important 10-year survival rate.

```r
rotterdam <- rotterdam %>%
  mutate(dtime_Years = floor(dtime/365)) %>%
  mutate('10_year_survival' = ifelse(dtime_Years >= 10, 1, 0))
```

Now we calculate the 10-year survival rate for the population in the dataset.

```r
rotterdam %>%
  group_by('10_year_survival') %>%
  summarise(number = n(), .groups = 'drop')
```

```
## # A tibble: 2 x 2
##   '10_year_survival' number
##                <dbl>  <int>
## 1                  0   2297
## 2                  1    685
```

```r
685/(685 + 2297)
```

```
## [1] 0.2297116
```

We can find that the 5-year survival rate for breast cancer is just fine, and around 70% of patients are able to live more than 5 years. However, the 10-year survival rate is still disappointing given the current medical level, and only around 20% patients could live more than 10 years after diagnosis.

```
rotterdam %>%
  group_by(grade) %>%
  summarise(number = n(), .groups = 'drop')
```

```
## # A tibble: 2 x 2
##    grade number
##    <fct>  <int>
## 1 2         794
## 2 3        2188
```

However, we have to notice that in our dataset, most patients are diagnosed with stage III breast cancer and a small portion are diagnosed with stage II breast cancer, which makes their cancer pretty severe already. This would give a pessimistic calculation of 5-year/ 10-year survival rates of breast cancer patients as a whole. In fact, according to webMD.com, the overall 5-year relative survival rate for breast cancer is 90% and the 10-year breast cancer relative survival rate is 84%.

Thus the important point is that female with high risk of breast caner(family inheritance, bad life habits, etc.) should have regular physical examination, with proper screening for breast cancer. Even if diagnosed, do not panic and take treatment as soon as possible. In this way, a breast cancer patients might be able to enjoy longer survival.

Another important yet sad point is that after cancer has recurred, it does not matter what treatment a patient takes and most people do not live up to 2 years if recurred. Thus patients should be extremely careful not getting cancer recurred.

Chapter 3

Survival

3.1 Loading Data

```
data(rotterdam)
```

3.2 Kaplan-Miere estimator of the entire dataset

Death Time

```
KM <- survfit(Surv(dtime, death) ~ 1, data = rotterdam)
plot(KM, conf.int = TRUE, col = "blue", xlab="Days", ylab="Survival")
```

```r
mean(rotterdam$dtime)
```

```
## [1] 2605.34
```
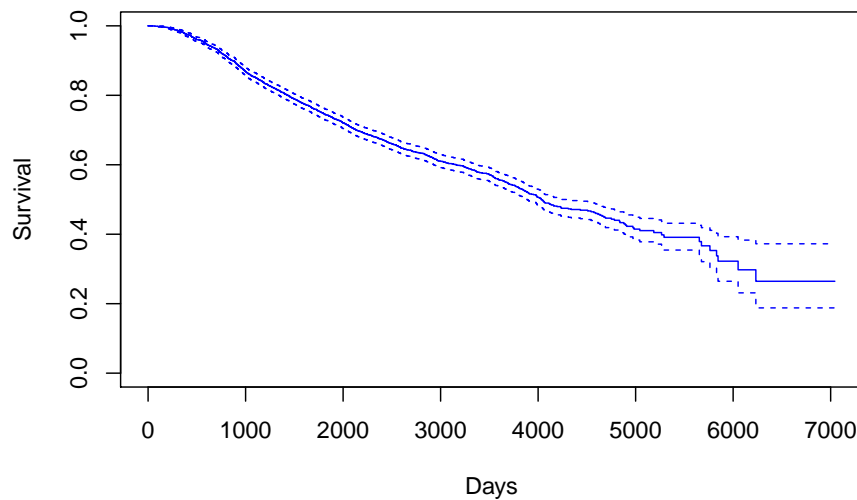
```r
median(rotterdam$dtime)
```

```
## [1] 2638.5
```

The overall mean survival time till death for breast cancer is 2605 days, which is approximately 7 years. The overall median survival time till death for breast cancer is 2638 days, which is also approximately 7 years.

Recurrence Time

```r
KM <- survfit(Surv(rtime, recur) ~ 1, data = rotterdam)
plot(KM, conf.int = TRUE, col = "blue", xlab="Days", ylab="Survival")
```
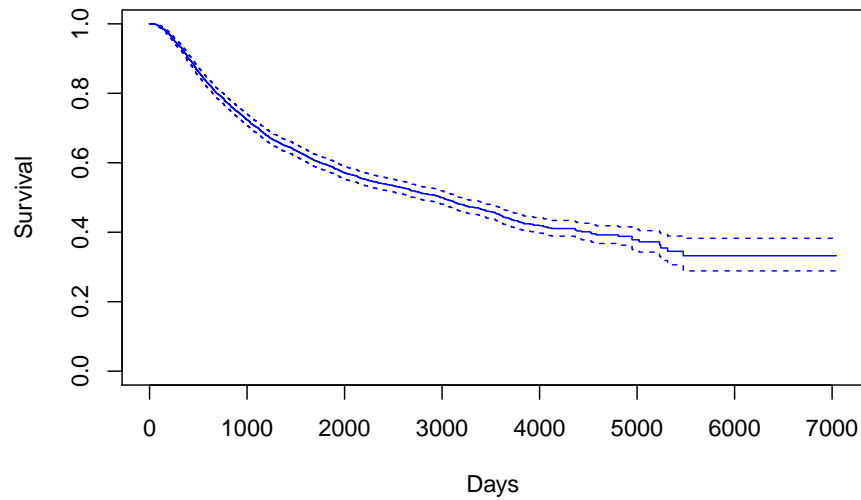
```r
mean(rotterdam$rtime)
```

```
## [1] 2097.903
```

```r
median(rotterdam$rtime)
```

```
## [1] 1940
```

The overall mean survival time till recurrence for breast cancer is 2097 days, which is approximately 6 years. The overall median survival time till recurrence for breast cancer is 1940 days, which is also approximately 5 years.

```r
KM <- survfit(Surv(drecurtime, death) ~ 1, data = rotterdam_recur)
plot(KM, conf.int = TRUE, col = "blue", xlab="Days", ylab="Survival")
```

```
mean(rotterdam_recur$drecurtime)
```

```
## [1] 978.5481
```

```
median(rotterdam_recur$drecurtime)
```

```
## [1] 719.5
```

The overall mean survival time after rucurrence till death for breast cancer is 834 days, which is approximately a little more than 2 years. The overall median survival time after rucurrence till death for breast cancer is 625 days, which is approximately less than 2 years.

Since a Kaplan-Miere estimator is unbiased, we could view the median as being very close to the true value of survival time.

3.3 Kaplan-Miere estimator on different variables in `rotterdam`

There are 16 variables in the `rotterdam` dataset. Of course we could have fit each variable with a KM estimator, but it would be meaningless to do them

all. We will stick to the Diagnostics and Treatment we mentioned in Chapter 2 and fit `size`, `Nodes_level`(we are not using nodes because a Kaplan-Miere estimator does not work well with quantitative variables), and `Treatment` each with KM estimators with respect to `dtime`, `rtime`, and `drecurtime` to grasp the survival time within each categories of the variables.

3.3.1   `size` vs. Survival Times

`size` vs. `dtime`

```
KM_None_Death <- survfit(Surv(dtime, death) ~ size, data = rotterdam)
plot(KM_None_Death, conf.type = "plain", col = c("black","red","blue"), xlab="Days", yl
legend(6000, 1, legend=c("<=20", "20-50", ">50"),
       col=c("black", "red", "blue"), lty=1, cex=0.8,
       title="Tumor Size", text.font=6)
```
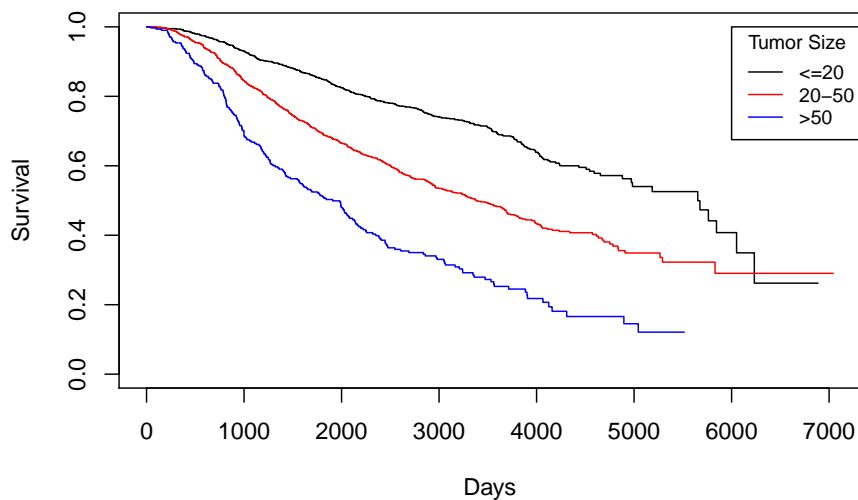

`size` vs. `rtime`

```
KM_None_Recur <- survfit(Surv(rtime, recur) ~ size, data = rotterdam)
plot(KM_None_Recur, conf.type = "plain", col = c("black","red","blue"), xlab="Days", yl
legend(6000, 1, legend=c("<=20", "20-50", ">50"),
       col=c("black", "red", "blue"), lty=1, cex=0.8,
       title="Tumor Size", text.font=6)
```

In general, patients with smaller tumor at diagnosis enjoys longer survival for both death and recurrence.

```
KM_None_drecur <- survfit(Surv(drecurtime, death) ~ size, data = rotterdam_recur)
plot(KM_None_drecur, conf.type = "plain", col = c("black","red","blue"), xlab="Days", ylab="Survi
legend(4500, 1, legend=c("<=20", "20-50", ">50"),
       col=c("black", "red", "blue"), lty=1, cex=0.8,
       title="Tumor Size", text.font=6)
```
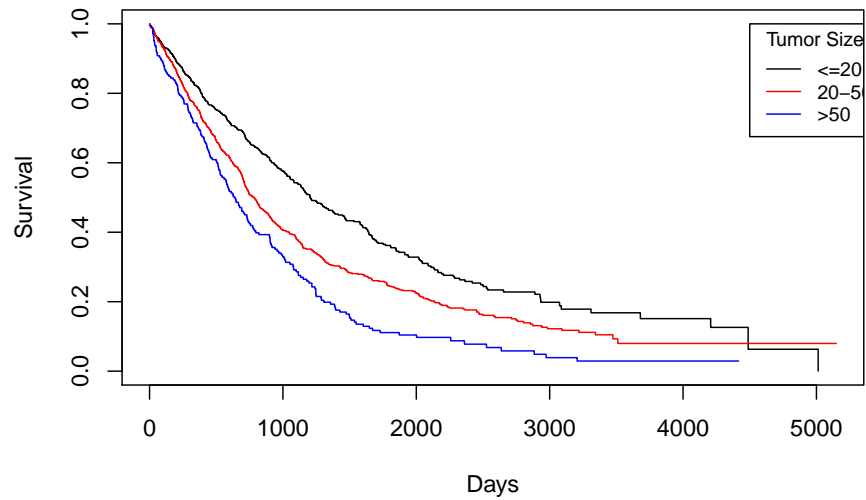
The trend is still the same as patients with smaller tumor size enjoy longer survival of death after recurrence, but the survival time now decreases much faster for all groups.

3.3.2   `Nodes_level` vs. Survival Times

Nodes_level vs. dtime

```
KM_None_Death <- survfit(Surv(dtime, death) ~ Nodes_level, data = rotterdam)
plot(KM_None_Death, conf.type = "plain", col = c("black","red","blue","orange"), xlab="
legend(6000, 1, legend=c("N0", "N1","N2", "N3"),
       col=c("black", "red", "blue", "orange"), lty=1, cex=0.8,
       title="Nodes_level", text.font=6)
```
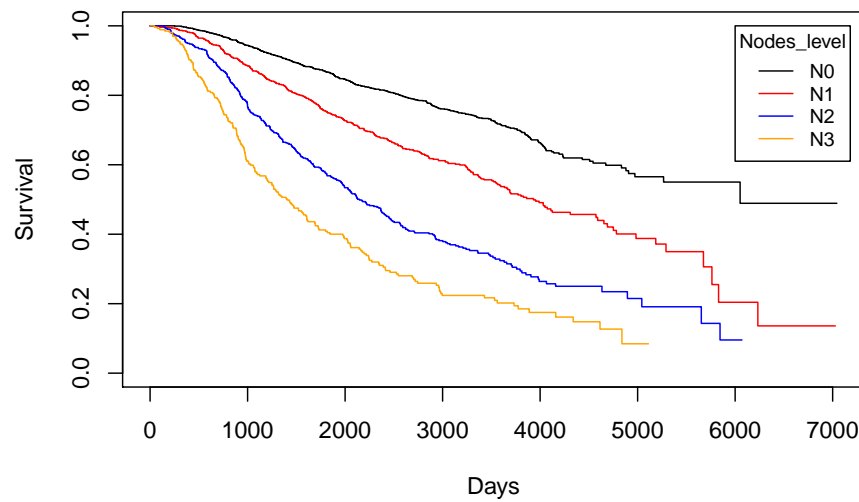
Nodes_level vs. `rtime`

```
KM_None_Recur <- survfit(Surv(rtime, recur) ~ Nodes_level, data = rotterdam)
plot(KM_None_Recur, conf.type = "plain", col = c("black","red","blue","orange"), xlab="Days", yla
legend(6000, 1, legend=c("N0", "N1","N2", "N3"),
       col=c("black", "red", "blue", "orange"), lty=1, cex=0.8,
       title="Nodes_level", text.font=6)
```

In general, patients with less nodes tested positive will enjoy longer survival for
both death and recurrence.

Nodes_level vs. drecurtime

```
KM_None_drecur <- survfit(Surv(drecurtime, death) ~ Nodes_level, data = rotterdam_recur
plot(KM_None_drecur, conf.type = "plain", col = c("black","red","blue","orange"), xlab=
legend(4500, 1, legend=c("N0", "N1","N2", "N3"),
       col=c("black", "red", "blue", "orange"), lty=1, cex=0.8,
       title="Nodes_level", text.font=6)
```
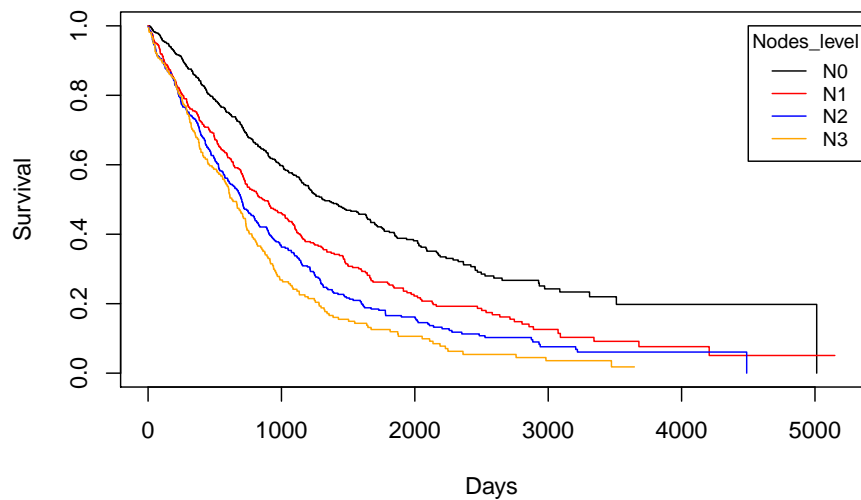
The trend is still the same as patients with fewer nodes tested positive enjoy longer survival of death after recurrence, but the survival time now decreases much faster for all groups, and the difference is small in groups `N1`, `N2` and `N3`.

3.3.3 Treatment vs. Survival Times

Treatment vs. dtime

```r
KM_Treatment_Death <- survfit(Surv(dtime, death) ~ Treatment, data = rotterdam)
plot(KM_Treatment_Death, conf.int = FALSE, col = c("black", "red", "blue", "orange"), xlab="Days"
legend(1, 0.4, legend=c("Both", "Chemo","Hormon", "NaN/Other Treatment"),
       col=c("black", "red", "blue", "orange"), lty=1, cex=0.8,
       title="Treatment Group", text.font=6)
```
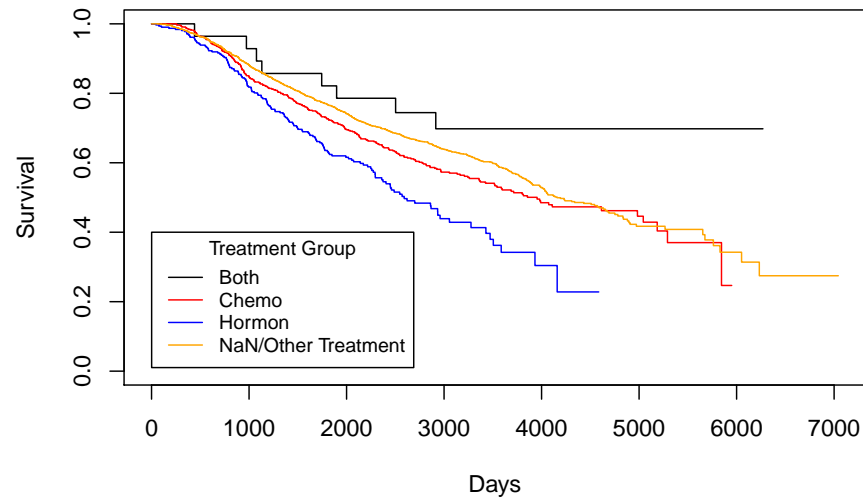
Treatment vs. rtime

```
KM_Treatment_Recur <- survfit(Surv(rtime, recur) ~ Treatment, data = rotterdam)
plot(KM_Treatment_Recur, conf.int = FALSE, col = c("black", "red", "blue", "orange"),
legend(1, 0.4, legend=c("Both", "Chemo","Hormon", "NaN/Other Treatment"),
       col=c("black", "red", "blue", "orange"), lty=1, cex=0.8,
       title="Treatment Group", text.font=6)
```
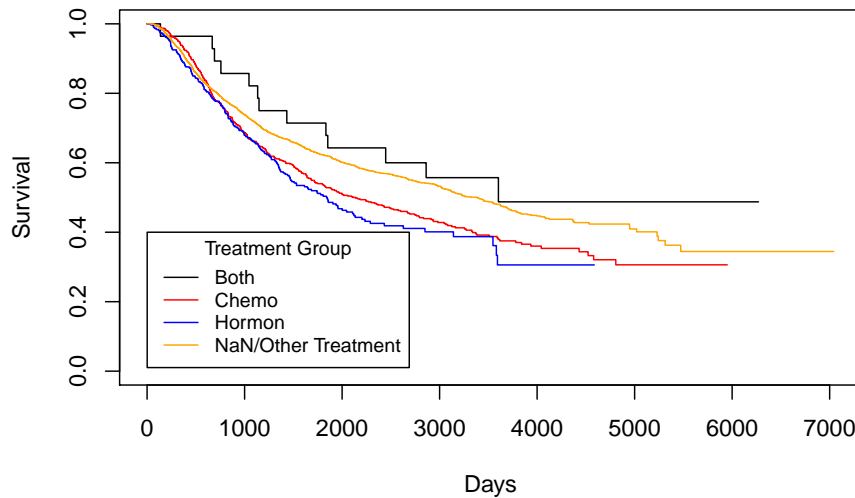
As we have discussed in Chapter 2, we know that generally chemotherapy is used on patients with age lower than 50 years old and hormontherapy is used on patients with age higher than 50 years old. Based on the difference of treatment, we could see that chemotherapy has a better effect than hormontherapy with respect to death time and a smaller yet still better effect regarding the recurrence time.

Treatment vs. `drecurtime`

```
KM_Treatment_drecur <- survfit(Surv(drecurtime, death) ~ Treatment, data = rotterdam_recur)
plot(KM_Treatment_drecur, conf.int = FALSE, col = c("black", "red", "blue", "orange"), xlab="Days
legend(3700, 1, legend=c("Both", "Chemo","Hormon", "NaN/Other Treatment"),
       col=c("black", "red", "blue", "orange"), lty=1, cex=0.8,
       title="Treatment Group", text.font=6)
```
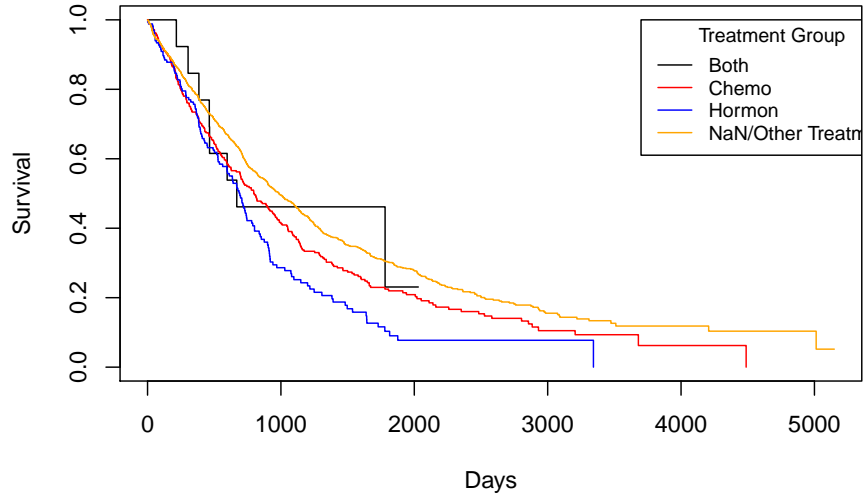
However, sadly enough, from the above plot we could see that no matter what treatment a patient use, it does not make a difference for the death survival time after cancer cells have recurred. This matches our conclusion from the visualization in Chapter 2.

3.4   Parametric Models

Another point that we are going to explore is if we would be able to fit our data to a parametric model. This matters since if we could fit any parametric model, then we should have a model good enough to generate predictions of breast cancer patients' survival and would have nice and interpretable coefficients to work with.

To do so, we will begin by checking if any of Exponential, Weibull, or Lognormal distribution would be adequate parametric assumption to cast on our data. We will verify the adequacy by checking the Cox-Snell residual plot. We will be fitting models using variables: `Treatment`, `size`, `nodes`, `age`(We have shown in Chapter 2 that age is a confounder for categories in Treatment).

3.4.1   User-defined Cox-Snell function

```r
# The Cox-Snell function takes as inputs
# 1. A vector of Cox-Snell residuals created by the user based on the model being evaluated,
# 2. A status vector
# 3. Optional x- and y- limits for the resulting plot

CoxSnell = function(cs,status,xlim=NULL,ylim=NULL)
{
kmcs = survfit(Surv(jitter(cs,amount=(max(cs)-min(cs))/1000),status) ~ 1)$surv

plot(log(-log(kmcs)) ~ sort(log(cs)) ,
      xlab="log(Cox-Snell)", ylab="log(-log(S(Cox-Snell)))", xlim=xlim, ylim=ylim )

abline(0,1,col='red')
}
```

3.4.2   Exponential models

We will begin by verifying the adequacy of Exponential model.

```r
Dexp <- survreg(Surv(dtime, death) ~ Treatment + size + nodes + age, dist='exponential', data=rot
Dexp
```

```
## Call:
## survreg(formula = Surv(dtime, death) ~ Treatment + size + nodes +
##     age, data = rotterdam, dist = "exponential")
##
## Coefficients:
##                 (Intercept)                 TreatmentChemo
##                  10.49678202                    -0.51997169
##            TreatmentHormon TreatmentNaN/Other Treatment
##                 -0.44961578                    -0.46574886
##                    size20-50                        size>50
##                 -0.46803053                    -0.81548193
##                        nodes                            age
##                 -0.06997150                    -0.01412165
##
## Scale fixed at 1
##
## Loglik(model)= -12137    Loglik(intercept only)= -12360.4
##   Chisq= 446.94 on 7 degrees of freedom, p= <2e-16
## n= 2982
```
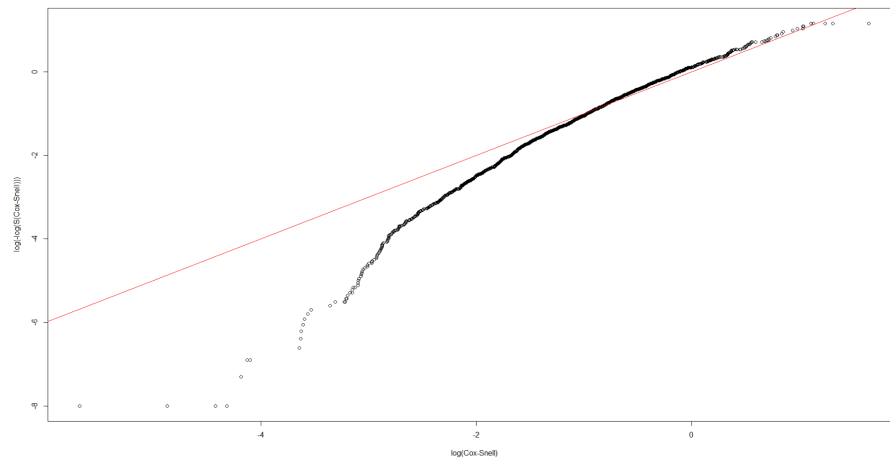
```
Dexp <- survreg(Surv(rtime, recur) ~ Treatment + size + nodes + age, dist='exponential
Dexp
```

```
## Call:
## survreg(formula = Surv(rtime, recur) ~ Treatment + size + nodes +
##     age, data = rotterdam, dist = "exponential")
##
## Coefficients:
##                 (Intercept)               TreatmentChemo
##                 8.818707424                  -0.372797596
##             TreatmentHormon TreatmentNaN/Other Treatment
##                -0.536512833                  -0.490056002
##                    size20-50                       size>50
##                -0.404626936                  -0.719554358
##                       nodes                           age
##                -0.082728526                   0.008130282
##
## Scale fixed at 1
##
## Loglik(model)= -13917.5   Loglik(intercept only)= -14153.7
##  Chisq= 472.4 on 7 degrees of freedom, p= <2e-16
## n= 2982
```
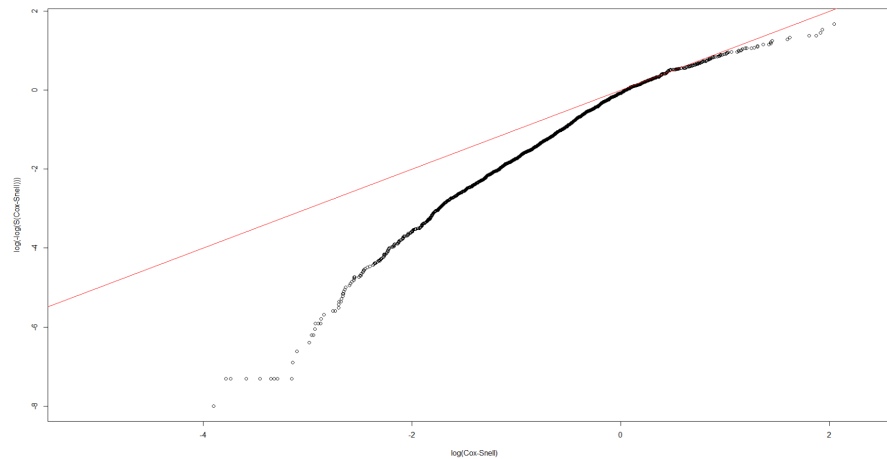
The Exponential does not seem adequate in this case.

3.4.3   Weibull models

Next we will examine the adequacy of Weibull model.

```
Dweibull <- survreg(Surv(dtime, death) ~ Treatment + size + nodes + age, dist='weibull', data=rot
Dweibull
```

```
## Call:
## survreg(formula = Surv(dtime, death) ~ Treatment + size + nodes +
##     age, data = rotterdam, dist = "weibull")
##
## Coefficients:
##                 (Intercept)            TreatmentChemo
##                  9.93741760               -0.40097983
##           TreatmentHormon TreatmentNaN/Other Treatment
##                 -0.40778590               -0.36210464
##                    size20-50                    size>50
##                 -0.35546640               -0.65448317
##                       nodes                        age
##                 -0.05589248               -0.01125732
##
## Scale= 0.739963
##
## Loglik(model)= -12068.9   Loglik(intercept only)= -12322.7
##  Chisq= 507.49 on 7 degrees of freedom, p= <2e-16
## n= 2982
```
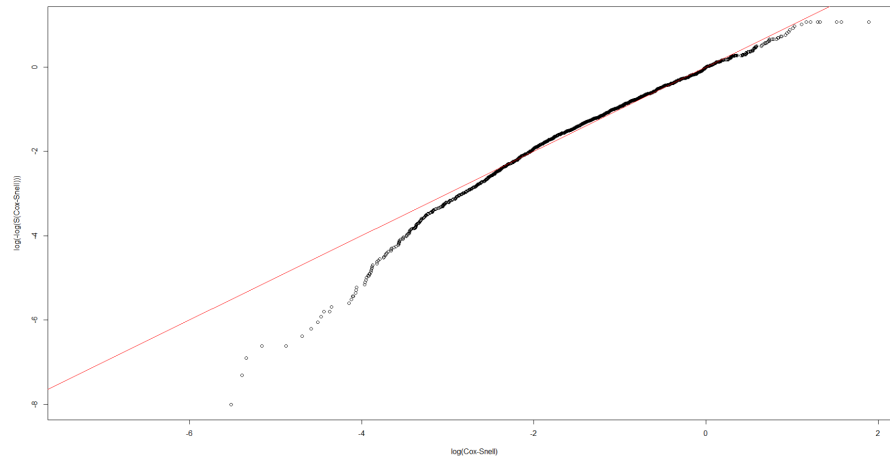
```
Dweibull <- survreg(Surv(rtime, recur) ~ Treatment + size + nodes + age, dist='weibull
Dweibull
```

```
## Call:
## survreg(formula = Surv(rtime, recur) ~ Treatment + size + nodes +
##     age, data = rotterdam, dist = "weibull")
##
## Coefficients:
##                 (Intercept)                TreatmentChemo
##                 8.830213089                   -0.376480833
##           TreatmentHormon TreatmentNaN/Other Treatment
##                -0.539278367                   -0.495766112
##                    size20-50                        size>50
##                -0.410910817                   -0.727355688
##                       nodes                            age
##                -0.083786844                    0.008292188
##
## Scale= 1.018498
##
## Loglik(model)= -13917.1   Loglik(intercept only)= -14145.7
##  Chisq= 457.19 on 7 degrees of freedom, p= <2e-16
## n= 2982
```
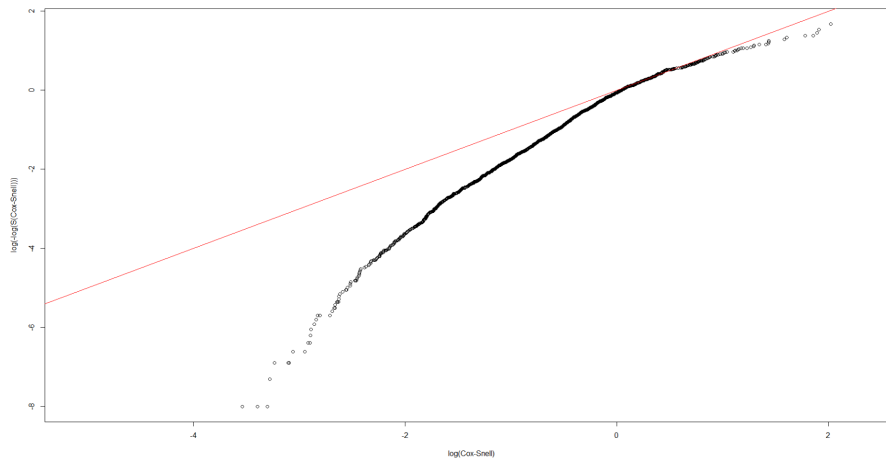
The Weibull model is still not adequate.

3.4.4 Log-normal models

Finally, we will examine the adequacy of Log-normal model.

```
Dlnorm <- survreg(Surv(dtime, death) ~ 1 , dist='lognormal', data=rotterdam)
Dlnorm
```

```
## Call:
## survreg(formula = Surv(dtime, death) ~ 1, data = rotterdam, dist = "lognormal")
##
## Coefficients:
## (Intercept)
##    8.318665
##
## Scale= 1.206342
##
## Loglik(model)= -12286.5   Loglik(intercept only)= -12286.5
## n= 2982
```

```
DLweibull <- survreg(Surv(dtime, death) ~ 1 , dist='weibull', data=rotterdam)
DLweibull
```

```
## Call:
## survreg(formula = Surv(dtime, death) ~ 1, data = rotterdam, dist = "weibull")
##
## Coefficients:
```

```
## (Intercept)
##    8.577572
##
## Scale= 0.7977553
##
## Loglik(model)= -12322.7   Loglik(intercept only)= -12322.7
## n= 2982
```

```r
CS_LnormD <- -log(1 - plnorm(rotterdam$dtime,  8.318665, 1.206342))
CS_WeibullD <- -log(1 - pweibull(rotterdam$dtime,  1/0.7977553, exp(8.577572)))
# Make appropriate graph using CoxSnell function
CoxSnell(CS_LnormD, rotterdam$death)
```
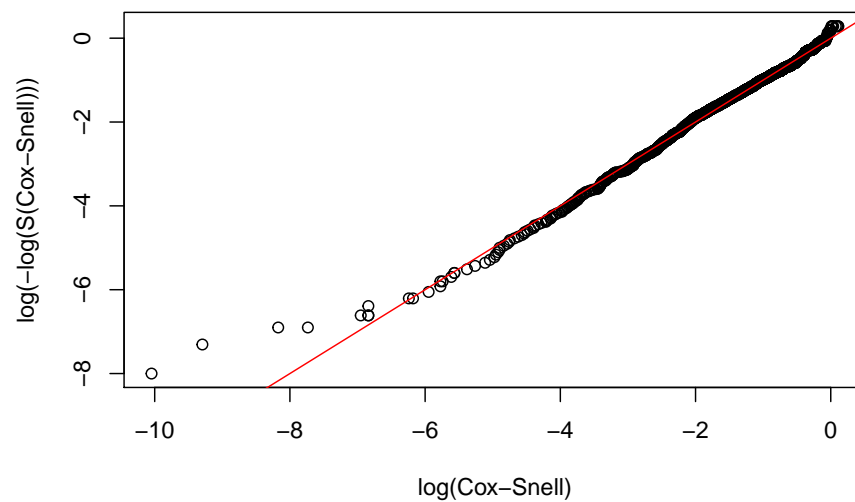


```r
CoxSnell(CS_WeibullD, rotterdam$death)
```
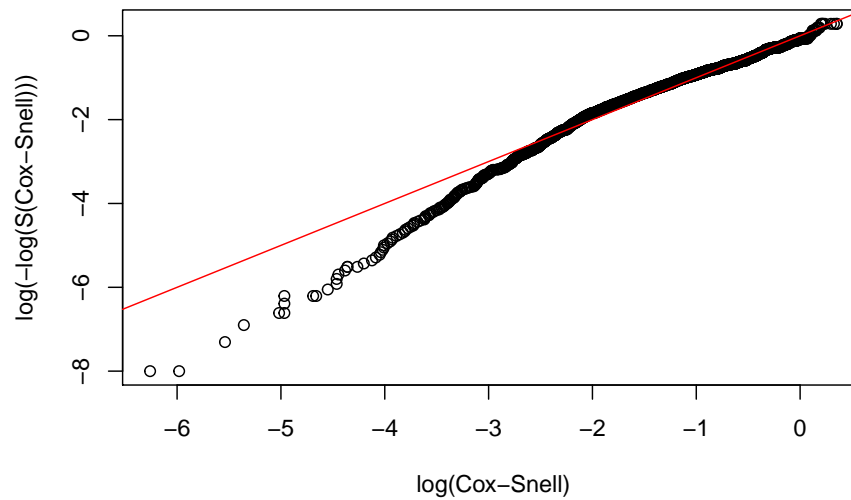
```
Dlnorm <- survreg(Surv(dtime, death) ~ Treatment + size + nodes + age , dist='lognormal', data=r
Dlnorm
```

```
## Call:
## survreg(formula = Surv(dtime, death) ~ Treatment + size + nodes +
##     age, data = rotterdam, dist = "lognormal")
##
## Coefficients:
##                 (Intercept)                 TreatmentChemo
##                 9.709442268                    -0.431016329
##          TreatmentHormon TreatmentNaN/Other Treatment
##                -0.346351742                    -0.423626557
##                    size20-50                         size>50
##                -0.372703559                    -0.654189313
##                       nodes                             age
##                -0.079103425                    -0.009903862
##
## Scale= 1.077329
##
## Loglik(model)= -12034.1   Loglik(intercept only)= -12286.5
##   Chisq= 504.67 on 7 degrees of freedom, p= <2e-16
## n= 2982
```

```
CS_LnormD <- -log(1 - plnorm(rotterdam$dtime, 9.709442268-0.431016329*(rotterdam$Treatr
                                  -0.346351742*(rotterdam$Treatment=="I
                                  -0.423626557*(rotterdam$Treatment=="I
                                  -0.372703559*(rotterdam$size=="20-50"
                                  -0.654189313*(rotterdam$size==">50")
                                  -0.079103425*rotterdam$nodes
                                  -0.009903862*rotterdam$age,
                           1.077329))
# Make appropriate graph using CoxSnell function
CoxSnell(CS_LnormD, rotterdam$death)
```
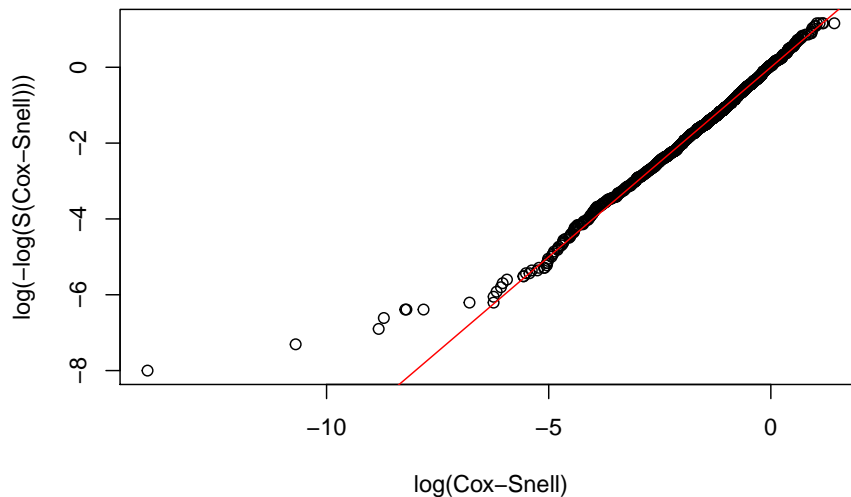


```
Rlnorm <- survreg(Surv(rtime, recur) ~ Treatment + size + nodes + age, dist='lognormal
Rlnorm
```

```
## Call:
## survreg(formula = Surv(rtime, recur) ~ Treatment + size + nodes +
##     age, data = rotterdam, dist = "lognormal")
##
## Coefficients:
##              (Intercept)            TreatmentChemo
##              8.514204484               -0.382172447
##          TreatmentHormon TreatmentNaN/Other Treatment
##             -0.479063703               -0.605193863
##                 size20-50                   size>50
```

```
##                    -0.458345796                    -0.738657689
##                           nodes                             age
##                    -0.107708963                     0.009059467
##
## Scale= 1.340545
##
## Loglik(model)= -13803.8   Loglik(intercept only)= -14045.8
##  Chisq= 483.94 on 7 degrees of freedom, p= <2e-16
## n= 2982
```

```r
CS_LnormR <- -log(1 - plnorm(rotterdam$rtime, 8.514204484-0.382172447*(rotterdam$Treatment=="Chem
                                   -0.479063703*(rotterdam$Treatment=="Hormon")
                                   -0.605193863*(rotterdam$Treatment=="NaN/Other T
                                   -0.458345796*(rotterdam$size=="20-50")
                                   -0.738657689*(rotterdam$size==">50")
                                   -0.107708963*rotterdam$nodes
                                   +0.009059467*rotterdam$age,
                              1.340545))

# Make appropriate graph using CoxSnell function
CoxSnell(CS_LnormR, rotterdam$recur)
```
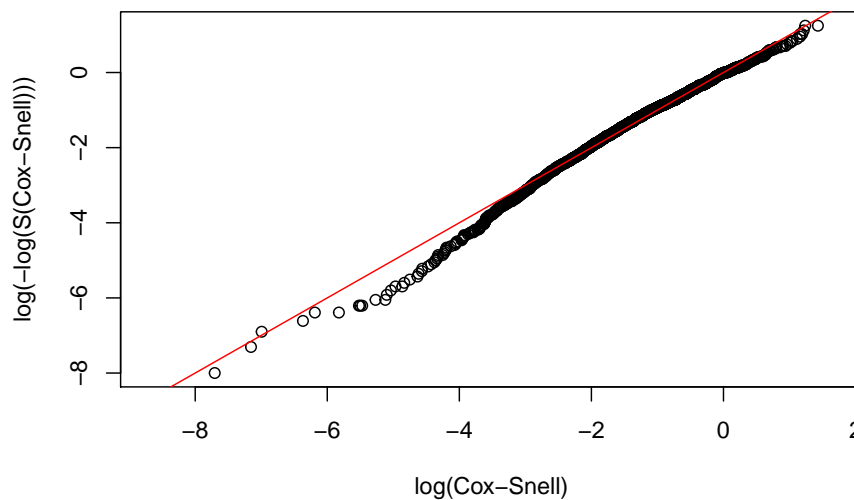

We could see that the Log-normal parametric model is an adequate model for both the `dtime` and `rtime` vs. `Treatment` + `size` + `nodes` + `age`.

TODO: why log-normal fit.

cumulative hazard?

```r
#{r} library(bshazard) fit <- bshazard(Surv(dtime, death) ~ 1,
data=rotterdam) KM <- survfit(Surv(dtime, death) ~ 1, data=rotterdam)
plot(fit, conf.int = FALSE) #
```

```r
meanlog <- 8.514204484-0.382172447*(rotterdam$Treatment=="Chemo")
                                    -0.479063703*(rotterdam$Treatment=="
```

```
##     [1]   0.0000000   0.0000000   0.0000000   0.0000000   0.0000000   0.0000000
##     [7]   0.0000000   0.0000000   0.0000000   0.0000000   0.0000000   0.0000000
##    [13]   0.0000000  -0.4790637   0.0000000   0.0000000  -0.4790637   0.0000000
##    [19]   0.0000000   0.0000000  -0.4790637   0.0000000   0.0000000   0.0000000
##    [25]   0.0000000   0.0000000   0.0000000   0.0000000   0.0000000   0.0000000
##    [31]   0.0000000   0.0000000   0.0000000   0.0000000   0.0000000   0.0000000
##    [37]   0.0000000   0.0000000   0.0000000   0.0000000   0.0000000   0.0000000
##    [43]   0.0000000   0.0000000   0.0000000   0.0000000   0.0000000  -0.4790637
##    [49]   0.0000000   0.0000000   0.0000000   0.0000000   0.0000000   0.0000000
##    [55]   0.0000000   0.0000000   0.0000000  -0.4790637   0.0000000   0.0000000
##    [61]   0.0000000   0.0000000   0.0000000   0.0000000   0.0000000   0.0000000
##    [67]   0.0000000   0.0000000   0.0000000   0.0000000   0.0000000   0.0000000
##    [73]   0.0000000   0.0000000   0.0000000   0.0000000   0.0000000   0.0000000
##    [79]  -0.4790637   0.0000000   0.0000000   0.0000000   0.0000000   0.0000000
##    [85]  -0.4790637   0.0000000   0.0000000   0.0000000   0.0000000   0.0000000
##    [91]   0.0000000   0.0000000   0.0000000   0.0000000   0.0000000   0.0000000
##    [97]   0.0000000  -0.4790637  -0.4790637   0.0000000   0.0000000   0.0000000
##   [103]   0.0000000  -0.4790637   0.0000000   0.0000000   0.0000000   0.0000000
##   [109]   0.0000000  -0.4790637   0.0000000   0.0000000   0.0000000   0.0000000
##   [115]   0.0000000   0.0000000  -0.4790637   0.0000000   0.0000000   0.0000000
##   [121]   0.0000000   0.0000000   0.0000000   0.0000000   0.0000000   0.0000000
##   [127]   0.0000000   0.0000000   0.0000000   0.0000000   0.0000000   0.0000000
##   [133]   0.0000000   0.0000000   0.0000000   0.0000000   0.0000000   0.0000000
##   [139]   0.0000000   0.0000000   0.0000000   0.0000000   0.0000000  -0.4790637
##   [145]  -0.4790637   0.0000000   0.0000000   0.0000000   0.0000000   0.0000000
##   [151]   0.0000000   0.0000000   0.0000000   0.0000000   0.0000000   0.0000000
##   [157]   0.0000000   0.0000000   0.0000000   0.0000000  -0.4790637   0.0000000
##   [163]   0.0000000   0.0000000   0.0000000   0.0000000  -0.4790637   0.0000000
##   [169]   0.0000000   0.0000000   0.0000000   0.0000000   0.0000000   0.0000000
##   [175]   0.0000000   0.0000000   0.0000000   0.0000000   0.0000000   0.0000000
##   [181]   0.0000000   0.0000000   0.0000000   0.0000000   0.0000000   0.0000000
##   [187]   0.0000000   0.0000000   0.0000000   0.0000000   0.0000000  -0.4790637
##   [193]  -0.4790637   0.0000000   0.0000000   0.0000000   0.0000000   0.0000000
##   [199]   0.0000000   0.0000000   0.0000000   0.0000000   0.0000000   0.0000000
##   [205]   0.0000000  -0.4790637   0.0000000   0.0000000   0.0000000   0.0000000
##   [211]  -0.4790637   0.0000000   0.0000000   0.0000000   0.0000000   0.0000000
##   [217]   0.0000000   0.0000000   0.0000000   0.0000000   0.0000000  -0.4790637
```

```
## [223]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [229]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [235]  0.0000000 -0.4790637  0.0000000  0.0000000  0.0000000  0.0000000
## [241]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [247]  0.0000000  0.0000000  0.0000000 -0.4790637  0.0000000  0.0000000
## [253]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [259]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000 -0.4790637
## [265]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [271]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [277]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [283]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [289] -0.4790637  0.0000000  0.0000000 -0.4790637  0.0000000  0.0000000
## [295] -0.4790637  0.0000000  0.0000000  0.0000000 -0.4790637  0.0000000
## [301]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [307] -0.4790637  0.0000000  0.0000000 -0.4790637  0.0000000  0.0000000
## [313]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [319]  0.0000000 -0.4790637  0.0000000  0.0000000  0.0000000  0.0000000
## [325]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [331]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000 -0.4790637
## [337]  0.0000000  0.0000000  0.0000000 -0.4790637  0.0000000  0.0000000
## [343]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [349]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [355]  0.0000000 -0.4790637  0.0000000  0.0000000  0.0000000  0.0000000
## [361]  0.0000000 -0.4790637  0.0000000  0.0000000  0.0000000  0.0000000
## [367]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [373]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [379]  0.0000000 -0.4790637  0.0000000  0.0000000  0.0000000  0.0000000
## [385]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000 -0.4790637
## [391]  0.0000000  0.0000000  0.0000000  0.0000000 -0.4790637  0.0000000
## [397]  0.0000000  0.0000000 -0.4790637  0.0000000  0.0000000  0.0000000
## [403]  0.0000000  0.0000000  0.0000000 -0.4790637  0.0000000  0.0000000
## [409]  0.0000000  0.0000000  0.0000000 -0.4790637  0.0000000  0.0000000
## [415]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [421] -0.4790637  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [427]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [433]  0.0000000  0.0000000  0.0000000 -0.4790637  0.0000000  0.0000000
## [439]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [445]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [451]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [457]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [463]  0.0000000 -0.4790637  0.0000000 -0.4790637  0.0000000  0.0000000
## [469]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [475]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [481]  0.0000000  0.0000000  0.0000000  0.0000000 -0.4790637  0.0000000
## [487]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [493]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
```

```
## [499]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [505]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [511]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [517]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [523]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [529]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [535]  0.0000000  0.0000000 -0.4790637  0.0000000  0.0000000  0.0000000
## [541]  0.0000000  0.0000000  0.0000000  0.0000000 -0.4790637  0.0000000
## [547]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [553]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [559]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [565] -0.4790637  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [571]  0.0000000 -0.4790637 -0.4790637  0.0000000  0.0000000  0.0000000
## [577]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [583]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [589]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000 -0.4790637
## [595]  0.0000000  0.0000000  0.0000000  0.0000000 -0.4790637  0.0000000
## [601]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [607]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [613]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [619]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [625]  0.0000000  0.0000000 -0.4790637  0.0000000 -0.4790637  0.0000000
## [631]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [637]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [643]  0.0000000  0.0000000 -0.4790637  0.0000000 -0.4790637  0.0000000
## [649]  0.0000000  0.0000000  0.0000000 -0.4790637  0.0000000  0.0000000
## [655]  0.0000000  0.0000000  0.0000000 -0.4790637  0.0000000  0.0000000
## [661]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [667]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [673] -0.4790637  0.0000000  0.0000000  0.0000000  0.0000000 -0.4790637
## [679]  0.0000000  0.0000000  0.0000000  0.0000000 -0.4790637  0.0000000
## [685]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000 -0.4790637
## [691]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [697] -0.4790637  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [703] -0.4790637  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [709]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [715]  0.0000000  0.0000000  0.0000000  0.0000000 -0.4790637  0.0000000
## [721]  0.0000000 -0.4790637  0.0000000  0.0000000  0.0000000  0.0000000
## [727] -0.4790637  0.0000000  0.0000000 -0.4790637  0.0000000  0.0000000
## [733]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [739]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [745]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [751]  0.0000000  0.0000000 -0.4790637  0.0000000  0.0000000  0.0000000
## [757]  0.0000000 -0.4790637  0.0000000  0.0000000  0.0000000  0.0000000
## [763]  0.0000000  0.0000000  0.0000000  0.0000000 -0.4790637  0.0000000
## [769]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
```

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##  [775]  0.0000000 -0.4790637  0.0000000  0.0000000  0.0000000  0.0000000
##  [781]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000 -0.4790637
##  [787]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
##  [793]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
##  [799]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
##  [805]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
##  [811]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
##  [817] -0.4790637  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
##  [823]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
##  [829]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000 -0.4790637
##  [835]  0.0000000  0.0000000  0.0000000 -0.4790637  0.0000000  0.0000000
##  [841]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
##  [847]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
##  [853]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
##  [859]  0.0000000  0.0000000 -0.4790637  0.0000000  0.0000000  0.0000000
##  [865]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000 -0.4790637
##  [871]  0.0000000  0.0000000 -0.4790637  0.0000000  0.0000000  0.0000000
##  [877] -0.4790637  0.0000000  0.0000000  0.0000000  0.0000000 -0.4790637
##  [883] -0.4790637  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
##  [889]  0.0000000  0.0000000 -0.4790637  0.0000000 -0.4790637  0.0000000
##  [895]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000 -0.4790637
##  [901]  0.0000000 -0.4790637 -0.4790637  0.0000000  0.0000000  0.0000000
##  [907]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
##  [913]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
##  [919]  0.0000000 -0.4790637  0.0000000  0.0000000  0.0000000  0.0000000
##  [925]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
##  [931] -0.4790637  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
##  [937]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
##  [943]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
##  [949]  0.0000000 -0.4790637  0.0000000  0.0000000 -0.4790637  0.0000000
##  [955]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
##  [961]  0.0000000  0.0000000 -0.4790637  0.0000000  0.0000000  0.0000000
##  [967]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
##  [973]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
##  [979]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
##  [985]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
##  [991]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
##  [997] -0.4790637  0.0000000  0.0000000  0.0000000  0.0000000 -0.4790637
## [1003]  0.0000000  0.0000000 -0.4790637  0.0000000  0.0000000  0.0000000
## [1009]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [1015]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [1021]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [1027]  0.0000000 -0.4790637  0.0000000  0.0000000  0.0000000  0.0000000
## [1033]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [1039]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000 -0.4790637
## [1045]  0.0000000 -0.4790637  0.0000000  0.0000000  0.0000000 -0.4790637
```

```
## [1051]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [1057]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000 -0.4790637
## [1063] -0.4790637  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [1069]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [1075] -0.4790637  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [1081]  0.0000000  0.0000000  0.0000000 -0.4790637  0.0000000  0.0000000
## [1087]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [1093]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [1099]  0.0000000  0.0000000  0.0000000 -0.4790637  0.0000000  0.0000000
## [1105]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000 -0.4790637
## [1111]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [1117]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [1123]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000 -0.4790637
## [1129] -0.4790637  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [1135]  0.0000000 -0.4790637  0.0000000  0.0000000  0.0000000  0.0000000
## [1141] -0.4790637  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [1147]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [1153]  0.0000000  0.0000000 -0.4790637  0.0000000  0.0000000  0.0000000
## [1159]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [1165]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [1171]  0.0000000  0.0000000 -0.4790637  0.0000000  0.0000000  0.0000000
## [1177]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [1183] -0.4790637  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [1189]  0.0000000  0.0000000  0.0000000  0.0000000 -0.4790637  0.0000000
## [1195]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [1201]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [1207]  0.0000000  0.0000000  0.0000000 -0.4790637  0.0000000  0.0000000
## [1213]  0.0000000  0.0000000 -0.4790637  0.0000000  0.0000000  0.0000000
## [1219]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [1225]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [1231]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [1237]  0.0000000  0.0000000  0.0000000 -0.4790637 -0.4790637  0.0000000
## [1243]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [1249] -0.4790637  0.0000000  0.0000000  0.0000000  0.0000000 -0.4790637
## [1255]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [1261] -0.4790637  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [1267]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [1273]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [1279]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [1285]  0.0000000  0.0000000  0.0000000  0.0000000 -0.4790637  0.0000000
## [1291]  0.0000000  0.0000000 -0.4790637  0.0000000  0.0000000  0.0000000
## [1297]  0.0000000  0.0000000  0.0000000  0.0000000 -0.4790637  0.0000000
## [1303]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [1309]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [1315]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [1321]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
```

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## [1327]   0.0000000   0.0000000   0.0000000   0.0000000   0.0000000   0.0000000
## [1333]   0.0000000   0.0000000   0.0000000   0.0000000   0.0000000   0.0000000
## [1339]   0.0000000   0.0000000   0.0000000   0.0000000   0.0000000   0.0000000
## [1345]   0.0000000   0.0000000   0.0000000   0.0000000   0.0000000   0.0000000
## [1351]   0.0000000   0.0000000   0.0000000   0.0000000   0.0000000   0.0000000
## [1357]   0.0000000   0.0000000   0.0000000   0.0000000   0.0000000   0.0000000
## [1363]   0.0000000   0.0000000   0.0000000   0.0000000   0.0000000   0.0000000
## [1369]   0.0000000   0.0000000   0.0000000   0.0000000   0.0000000   0.0000000
## [1375]   0.0000000   0.0000000   0.0000000   0.0000000   0.0000000   0.0000000
## [1381]   0.0000000   0.0000000   0.0000000   0.0000000   0.0000000   0.0000000
## [1387]   0.0000000   0.0000000   0.0000000   0.0000000   0.0000000   0.0000000
## [1393]   0.0000000  -0.4790637   0.0000000   0.0000000  -0.4790637   0.0000000
## [1399]   0.0000000   0.0000000   0.0000000   0.0000000   0.0000000   0.0000000
## [1405]   0.0000000   0.0000000   0.0000000   0.0000000   0.0000000  -0.4790637
## [1411]   0.0000000   0.0000000   0.0000000   0.0000000   0.0000000   0.0000000
## [1417]   0.0000000   0.0000000   0.0000000   0.0000000   0.0000000   0.0000000
## [1423]   0.0000000   0.0000000  -0.4790637   0.0000000   0.0000000   0.0000000
## [1429]   0.0000000   0.0000000   0.0000000   0.0000000   0.0000000   0.0000000
## [1435]   0.0000000   0.0000000   0.0000000   0.0000000  -0.4790637   0.0000000
## [1441]   0.0000000   0.0000000   0.0000000   0.0000000   0.0000000   0.0000000
## [1447]   0.0000000   0.0000000   0.0000000   0.0000000  -0.4790637   0.0000000
## [1453]   0.0000000   0.0000000   0.0000000   0.0000000   0.0000000   0.0000000
## [1459]   0.0000000   0.0000000   0.0000000   0.0000000   0.0000000   0.0000000
## [1465]   0.0000000   0.0000000   0.0000000   0.0000000   0.0000000   0.0000000
## [1471]   0.0000000   0.0000000   0.0000000   0.0000000   0.0000000   0.0000000
## [1477]   0.0000000   0.0000000   0.0000000   0.0000000   0.0000000   0.0000000
## [1483]   0.0000000   0.0000000   0.0000000   0.0000000   0.0000000   0.0000000
## [1489]   0.0000000   0.0000000   0.0000000   0.0000000   0.0000000   0.0000000
## [1495]   0.0000000   0.0000000   0.0000000   0.0000000   0.0000000   0.0000000
## [1501]  -0.4790637   0.0000000   0.0000000   0.0000000   0.0000000   0.0000000
## [1507]   0.0000000   0.0000000   0.0000000   0.0000000   0.0000000   0.0000000
## [1513]   0.0000000   0.0000000   0.0000000   0.0000000   0.0000000  -0.4790637
## [1519]   0.0000000   0.0000000   0.0000000   0.0000000   0.0000000   0.0000000
## [1525]   0.0000000   0.0000000   0.0000000   0.0000000   0.0000000   0.0000000
## [1531]   0.0000000   0.0000000   0.0000000   0.0000000   0.0000000   0.0000000
## [1537]   0.0000000   0.0000000  -0.4790637  -0.4790637   0.0000000   0.0000000
## [1543]   0.0000000   0.0000000   0.0000000   0.0000000   0.0000000   0.0000000
## [1549]   0.0000000   0.0000000   0.0000000   0.0000000   0.0000000   0.0000000
## [1555]   0.0000000   0.0000000   0.0000000   0.0000000   0.0000000   0.0000000
## [1561]   0.0000000   0.0000000   0.0000000   0.0000000   0.0000000   0.0000000
## [1567]  -0.4790637   0.0000000   0.0000000   0.0000000   0.0000000   0.0000000
## [1573]   0.0000000   0.0000000   0.0000000  -0.4790637  -0.4790637  -0.4790637
## [1579]   0.0000000   0.0000000   0.0000000   0.0000000   0.0000000   0.0000000
## [1585]   0.0000000   0.0000000   0.0000000   0.0000000   0.0000000   0.0000000
## [1591]   0.0000000   0.0000000   0.0000000   0.0000000   0.0000000   0.0000000
## [1597]   0.0000000   0.0000000   0.0000000   0.0000000   0.0000000   0.0000000
```

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## [1603]  0.0000000  0.0000000 -0.4790637  0.0000000  0.0000000  0.0000000
## [1609]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [1615]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [1621]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000 -0.4790637
## [1627]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [1633] -0.4790637  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [1639]  0.0000000 -0.4790637 -0.4790637  0.0000000  0.0000000  0.0000000
## [1645]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [1651]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [1657]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000 -0.4790637
## [1663]  0.0000000  0.0000000  0.0000000 -0.4790637  0.0000000 -0.4790637
## [1669]  0.0000000  0.0000000  0.0000000  0.0000000 -0.4790637  0.0000000
## [1675]  0.0000000  0.0000000  0.0000000  0.0000000 -0.4790637  0.0000000
## [1681]  0.0000000  0.0000000 -0.4790637  0.0000000  0.0000000  0.0000000
## [1687]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [1693]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [1699]  0.0000000  0.0000000 -0.4790637  0.0000000  0.0000000  0.0000000
## [1705]  0.0000000 -0.4790637  0.0000000  0.0000000  0.0000000  0.0000000
## [1711] -0.4790637  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [1717]  0.0000000 -0.4790637  0.0000000  0.0000000  0.0000000  0.0000000
## [1723]  0.0000000  0.0000000 -0.4790637 -0.4790637  0.0000000  0.0000000
## [1729]  0.0000000  0.0000000 -0.4790637  0.0000000  0.0000000  0.0000000
## [1735]  0.0000000 -0.4790637 -0.4790637  0.0000000  0.0000000  0.0000000
## [1741]  0.0000000  0.0000000  0.0000000 -0.4790637  0.0000000 -0.4790637
## [1747]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [1753]  0.0000000 -0.4790637  0.0000000  0.0000000  0.0000000  0.0000000
## [1759]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [1765]  0.0000000 -0.4790637  0.0000000  0.0000000  0.0000000  0.0000000
## [1771]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [1777]  0.0000000  0.0000000  0.0000000 -0.4790637  0.0000000  0.0000000
## [1783]  0.0000000 -0.4790637  0.0000000  0.0000000 -0.4790637  0.0000000
## [1789]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [1795]  0.0000000  0.0000000 -0.4790637  0.0000000  0.0000000 -0.4790637
## [1801]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [1807]  0.0000000  0.0000000  0.0000000  0.0000000 -0.4790637  0.0000000
## [1813]  0.0000000  0.0000000  0.0000000  0.0000000 -0.4790637  0.0000000
## [1819]  0.0000000  0.0000000  0.0000000  0.0000000 -0.4790637  0.0000000
## [1825]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [1831] -0.4790637  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [1837] -0.4790637  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [1843] -0.4790637  0.0000000  0.0000000  0.0000000 -0.4790637 -0.4790637
## [1849]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [1855]  0.0000000 -0.4790637  0.0000000  0.0000000  0.0000000  0.0000000
## [1861]  0.0000000  0.0000000 -0.4790637  0.0000000  0.0000000  0.0000000
## [1867]  0.0000000  0.0000000  0.0000000 -0.4790637  0.0000000 -0.4790637
## [1873]  0.0000000 -0.4790637  0.0000000  0.0000000  0.0000000  0.0000000
```

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## [1879]  0.0000000  0.0000000  0.0000000 -0.4790637  0.0000000 -0.4790637
## [1885]  0.0000000 -0.4790637  0.0000000  0.0000000  0.0000000  0.0000000
## [1891]  0.0000000  0.0000000 -0.4790637  0.0000000  0.0000000  0.0000000
## [1897]  0.0000000  0.0000000 -0.4790637 -0.4790637 -0.4790637 -0.4790637
## [1903]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000 -0.4790637
## [1909]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [1915] -0.4790637  0.0000000 -0.4790637  0.0000000  0.0000000  0.0000000
## [1921]  0.0000000 -0.4790637  0.0000000  0.0000000  0.0000000 -0.4790637
## [1927] -0.4790637  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [1933]  0.0000000  0.0000000 -0.4790637 -0.4790637  0.0000000  0.0000000
## [1939] -0.4790637 -0.4790637  0.0000000  0.0000000  0.0000000  0.0000000
## [1945]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000 -0.4790637
## [1951]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [1957]  0.0000000 -0.4790637 -0.4790637  0.0000000  0.0000000 -0.4790637
## [1963]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000 -0.4790637
## [1969]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000 -0.4790637
## [1975]  0.0000000 -0.4790637  0.0000000  0.0000000  0.0000000 -0.4790637
## [1981]  0.0000000  0.0000000 -0.4790637  0.0000000  0.0000000  0.0000000
## [1987]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [1993] -0.4790637 -0.4790637  0.0000000 -0.4790637  0.0000000 -0.4790637
## [1999]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [2005]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000 -0.4790637
## [2011]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [2017]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000 -0.4790637
## [2023]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [2029]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [2035]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [2041]  0.0000000  0.0000000  0.0000000 -0.4790637  0.0000000  0.0000000
## [2047] -0.4790637  0.0000000  0.0000000  0.0000000  0.0000000 -0.4790637
## [2053]  0.0000000  0.0000000  0.0000000  0.0000000 -0.4790637  0.0000000
## [2059]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [2065] -0.4790637  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [2071]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [2077]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [2083]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [2089]  0.0000000  0.0000000 -0.4790637  0.0000000  0.0000000  0.0000000
## [2095]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [2101]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [2107]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [2113]  0.0000000 -0.4790637  0.0000000  0.0000000  0.0000000 -0.4790637
## [2119]  0.0000000  0.0000000  0.0000000 -0.4790637  0.0000000  0.0000000
## [2125]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [2131]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [2137]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [2143]  0.0000000 -0.4790637  0.0000000  0.0000000  0.0000000 -0.4790637
## [2149] -0.4790637  0.0000000 -0.4790637  0.0000000  0.0000000  0.0000000
```

```
## [2155]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000 -0.4790637
## [2161]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [2167]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [2173]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [2179] -0.4790637  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [2185]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [2191] -0.4790637  0.0000000  0.0000000 -0.4790637  0.0000000  0.0000000
## [2197]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [2203]  0.0000000 -0.4790637  0.0000000  0.0000000  0.0000000  0.0000000
## [2209]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [2215]  0.0000000 -0.4790637  0.0000000  0.0000000  0.0000000  0.0000000
## [2221]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [2227]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [2233]  0.0000000 -0.4790637  0.0000000  0.0000000  0.0000000  0.0000000
## [2239]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [2245]  0.0000000 -0.4790637 -0.4790637  0.0000000  0.0000000  0.0000000
## [2251] -0.4790637  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [2257] -0.4790637  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [2263]  0.0000000 -0.4790637  0.0000000  0.0000000 -0.4790637  0.0000000
## [2269]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [2275]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [2281]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [2287]  0.0000000  0.0000000  0.0000000 -0.4790637  0.0000000  0.0000000
## [2293]  0.0000000  0.0000000  0.0000000 -0.4790637  0.0000000  0.0000000
## [2299]  0.0000000  0.0000000  0.0000000 -0.4790637 -0.4790637  0.0000000
## [2305]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [2311]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [2317]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [2323]  0.0000000  0.0000000  0.0000000 -0.4790637  0.0000000  0.0000000
## [2329]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [2335]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [2341]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [2347]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [2353]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [2359]  0.0000000 -0.4790637  0.0000000  0.0000000  0.0000000  0.0000000
## [2365]  0.0000000  0.0000000  0.0000000  0.0000000 -0.4790637  0.0000000
## [2371]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [2377]  0.0000000  0.0000000 -0.4790637  0.0000000  0.0000000 -0.4790637
## [2383]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [2389]  0.0000000 -0.4790637  0.0000000 -0.4790637  0.0000000  0.0000000
## [2395]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [2401]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [2407]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [2413]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [2419]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [2425]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000 -0.4790637
```

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## [2431]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [2437]  0.0000000 -0.4790637  0.0000000  0.0000000  0.0000000  0.0000000
## [2443]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [2449]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000 -0.4790637
## [2455]  0.0000000  0.0000000 -0.4790637  0.0000000  0.0000000  0.0000000
## [2461]  0.0000000  0.0000000  0.0000000  0.0000000 -0.4790637  0.0000000
## [2467]  0.0000000  0.0000000  0.0000000 -0.4790637  0.0000000 -0.4790637
## [2473]  0.0000000 -0.4790637  0.0000000  0.0000000 -0.4790637  0.0000000
## [2479]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [2485]  0.0000000  0.0000000  0.0000000 -0.4790637  0.0000000  0.0000000
## [2491] -0.4790637  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [2497]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [2503]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [2509]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [2515]  0.0000000  0.0000000  0.0000000 -0.4790637  0.0000000  0.0000000
## [2521]  0.0000000  0.0000000 -0.4790637  0.0000000  0.0000000  0.0000000
## [2527]  0.0000000  0.0000000  0.0000000  0.0000000 -0.4790637  0.0000000
## [2533]  0.0000000  0.0000000 -0.4790637  0.0000000  0.0000000  0.0000000
## [2539]  0.0000000 -0.4790637  0.0000000  0.0000000  0.0000000  0.0000000
## [2545]  0.0000000  0.0000000  0.0000000  0.0000000 -0.4790637 -0.4790637
## [2551] -0.4790637  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [2557]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [2563] -0.4790637  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [2569]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [2575]  0.0000000  0.0000000  0.0000000  0.0000000 -0.4790637  0.0000000
## [2581]  0.0000000  0.0000000  0.0000000 -0.4790637  0.0000000  0.0000000
## [2587]  0.0000000 -0.4790637 -0.4790637  0.0000000  0.0000000  0.0000000
## [2593]  0.0000000  0.0000000  0.0000000  0.0000000 -0.4790637  0.0000000
## [2599]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [2605]  0.0000000 -0.4790637  0.0000000  0.0000000  0.0000000  0.0000000
## [2611]  0.0000000  0.0000000  0.0000000  0.0000000 -0.4790637  0.0000000
## [2617]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [2623]  0.0000000 -0.4790637  0.0000000  0.0000000  0.0000000  0.0000000
## [2629]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [2635]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [2641]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [2647]  0.0000000  0.0000000  0.0000000 -0.4790637 -0.4790637  0.0000000
## [2653]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [2659]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [2665]  0.0000000  0.0000000  0.0000000  0.0000000 -0.4790637 -0.4790637
## [2671]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [2677]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [2683]  0.0000000 -0.4790637  0.0000000  0.0000000  0.0000000  0.0000000
## [2689]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [2695]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [2701]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
```

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## [2707]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [2713]  0.0000000 -0.4790637  0.0000000  0.0000000  0.0000000  0.0000000
## [2719]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [2725] -0.4790637  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [2731]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [2737]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000 -0.4790637
## [2743]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000 -0.4790637
## [2749]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000 -0.4790637
## [2755]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [2761]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [2767]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [2773]  0.0000000  0.0000000 -0.4790637  0.0000000 -0.4790637  0.0000000
## [2779]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [2785]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [2791] -0.4790637  0.0000000  0.0000000 -0.4790637  0.0000000  0.0000000
## [2797]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [2803]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [2809]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [2815]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [2821]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [2827]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [2833] -0.4790637 -0.4790637  0.0000000  0.0000000  0.0000000  0.0000000
## [2839]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [2845]  0.0000000  0.0000000 -0.4790637  0.0000000  0.0000000  0.0000000
## [2851]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [2857] -0.4790637  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [2863]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [2869]  0.0000000  0.0000000  0.0000000 -0.4790637  0.0000000  0.0000000
## [2875]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [2881]  0.0000000  0.0000000  0.0000000 -0.4790637 -0.4790637  0.0000000
## [2887]  0.0000000  0.0000000  0.0000000 -0.4790637  0.0000000  0.0000000
## [2893]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [2899]  0.0000000  0.0000000  0.0000000 -0.4790637  0.0000000  0.0000000
## [2905]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [2911]  0.0000000  0.0000000  0.0000000 -0.4790637  0.0000000 -0.4790637
## [2917]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [2923]  0.0000000  0.0000000 -0.4790637  0.0000000  0.0000000  0.0000000
## [2929]  0.0000000  0.0000000 -0.4790637  0.0000000  0.0000000 -0.4790637
## [2935]  0.0000000  0.0000000  0.0000000 -0.4790637  0.0000000  0.0000000
## [2941]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [2947]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [2953]  0.0000000  0.0000000 -0.4790637  0.0000000  0.0000000  0.0000000
## [2959]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000 -0.4790637
## [2965]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [2971]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [2977]  0.0000000  0.0000000 -0.4790637  0.0000000  0.0000000 -0.4790637
```

```
                                                             -0.605193863*(rotterdam$Treatment=="NaN/Other T
```

```
##    [1] -0.6051939 -0.6051939 -0.6051939 -0.6051939 -0.6051939 -0.6051939
##    [7] -0.6051939 -0.6051939 -0.6051939 -0.6051939 -0.6051939  0.0000000
##   [13] -0.6051939  0.0000000 -0.6051939 -0.6051939  0.0000000 -0.6051939
##   [19] -0.6051939 -0.6051939  0.0000000 -0.6051939 -0.6051939 -0.6051939
##   [25] -0.6051939 -0.6051939 -0.6051939 -0.6051939  0.0000000 -0.6051939
##   [31] -0.6051939  0.0000000 -0.6051939 -0.6051939  0.0000000  0.0000000
##   [37] -0.6051939 -0.6051939 -0.6051939 -0.6051939 -0.6051939 -0.6051939
##   [43] -0.6051939 -0.6051939 -0.6051939 -0.6051939 -0.6051939  0.0000000
##   [49] -0.6051939 -0.6051939 -0.6051939  0.0000000 -0.6051939  0.0000000
##   [55] -0.6051939  0.0000000 -0.6051939  0.0000000 -0.6051939 -0.6051939
##   [61] -0.6051939 -0.6051939 -0.6051939 -0.6051939 -0.6051939 -0.6051939
##   [67]  0.0000000 -0.6051939 -0.6051939  0.0000000 -0.6051939  0.0000000
##   [73] -0.6051939 -0.6051939 -0.6051939 -0.6051939 -0.6051939 -0.6051939
##   [79]  0.0000000 -0.6051939 -0.6051939 -0.6051939 -0.6051939 -0.6051939
##   [85]  0.0000000 -0.6051939  0.0000000 -0.6051939 -0.6051939 -0.6051939
##   [91] -0.6051939  0.0000000 -0.6051939 -0.6051939 -0.6051939  0.0000000
##   [97] -0.6051939  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
##  [103] -0.6051939  0.0000000  0.0000000 -0.6051939  0.0000000 -0.6051939
##  [109]  0.0000000  0.0000000 -0.6051939 -0.6051939  0.0000000 -0.6051939
##  [115] -0.6051939 -0.6051939  0.0000000  0.0000000 -0.6051939  0.0000000
##  [121] -0.6051939 -0.6051939  0.0000000 -0.6051939 -0.6051939 -0.6051939
##  [127] -0.6051939 -0.6051939 -0.6051939 -0.6051939 -0.6051939 -0.6051939
##  [133] -0.6051939 -0.6051939 -0.6051939 -0.6051939 -0.6051939 -0.6051939
##  [139] -0.6051939 -0.6051939 -0.6051939 -0.6051939 -0.6051939  0.0000000
##  [145]  0.0000000 -0.6051939  0.0000000 -0.6051939  0.0000000 -0.6051939
##  [151] -0.6051939 -0.6051939 -0.6051939 -0.6051939 -0.6051939 -0.6051939
##  [157]  0.0000000 -0.6051939 -0.6051939 -0.6051939  0.0000000 -0.6051939
##  [163] -0.6051939  0.0000000 -0.6051939 -0.6051939  0.0000000 -0.6051939
##  [169] -0.6051939 -0.6051939  0.0000000  0.0000000 -0.6051939 -0.6051939
##  [175] -0.6051939 -0.6051939 -0.6051939 -0.6051939 -0.6051939  0.0000000
##  [181] -0.6051939 -0.6051939 -0.6051939 -0.6051939 -0.6051939 -0.6051939
##  [187] -0.6051939 -0.6051939 -0.6051939 -0.6051939  0.0000000  0.0000000
##  [193]  0.0000000 -0.6051939  0.0000000 -0.6051939 -0.6051939  0.0000000
##  [199] -0.6051939 -0.6051939 -0.6051939  0.0000000 -0.6051939 -0.6051939
##  [205] -0.6051939  0.0000000 -0.6051939 -0.6051939 -0.6051939  0.0000000
##  [211]  0.0000000 -0.6051939  0.0000000 -0.6051939 -0.6051939 -0.6051939
##  [217]  0.0000000 -0.6051939  0.0000000 -0.6051939 -0.6051939  0.0000000
##  [223] -0.6051939 -0.6051939 -0.6051939 -0.6051939 -0.6051939 -0.6051939
##  [229] -0.6051939 -0.6051939 -0.6051939 -0.6051939  0.0000000 -0.6051939
##  [235] -0.6051939  0.0000000 -0.6051939 -0.6051939 -0.6051939  0.0000000
##  [241]  0.0000000 -0.6051939 -0.6051939 -0.6051939  0.0000000 -0.6051939
##  [247]  0.0000000 -0.6051939 -0.6051939  0.0000000 -0.6051939  0.0000000
##  [253] -0.6051939 -0.6051939  0.0000000 -0.6051939  0.0000000 -0.6051939
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##   [259]  0.0000000 -0.6051939 -0.6051939 -0.6051939 -0.6051939  0.0000000
##   [265] -0.6051939 -0.6051939 -0.6051939 -0.6051939 -0.6051939 -0.6051939
##   [271] -0.6051939 -0.6051939 -0.6051939 -0.6051939 -0.6051939 -0.6051939
##   [277] -0.6051939 -0.6051939 -0.6051939 -0.6051939 -0.6051939 -0.6051939
##   [283] -0.6051939 -0.6051939 -0.6051939 -0.6051939 -0.6051939 -0.6051939
##   [289]  0.0000000 -0.6051939 -0.6051939  0.0000000 -0.6051939 -0.6051939
##   [295]  0.0000000 -0.6051939 -0.6051939 -0.6051939  0.0000000  0.0000000
##   [301] -0.6051939 -0.6051939  0.0000000 -0.6051939 -0.6051939  0.0000000
##   [307]  0.0000000 -0.6051939 -0.6051939  0.0000000 -0.6051939  0.0000000
##   [313] -0.6051939 -0.6051939 -0.6051939  0.0000000 -0.6051939 -0.6051939
##   [319] -0.6051939  0.0000000 -0.6051939  0.0000000 -0.6051939 -0.6051939
##   [325] -0.6051939 -0.6051939 -0.6051939 -0.6051939 -0.6051939  0.0000000
##   [331] -0.6051939 -0.6051939  0.0000000  0.0000000  0.0000000  0.0000000
##   [337] -0.6051939  0.0000000 -0.6051939  0.0000000 -0.6051939 -0.6051939
##   [343] -0.6051939 -0.6051939 -0.6051939 -0.6051939 -0.6051939 -0.6051939
##   [349] -0.6051939 -0.6051939 -0.6051939 -0.6051939 -0.6051939 -0.6051939
##   [355] -0.6051939  0.0000000 -0.6051939  0.0000000 -0.6051939  0.0000000
##   [361] -0.6051939  0.0000000 -0.6051939 -0.6051939 -0.6051939  0.0000000
##   [367] -0.6051939 -0.6051939 -0.6051939 -0.6051939 -0.6051939  0.0000000
##   [373] -0.6051939 -0.6051939  0.0000000 -0.6051939 -0.6051939 -0.6051939
##   [379] -0.6051939  0.0000000 -0.6051939 -0.6051939 -0.6051939 -0.6051939
##   [385] -0.6051939 -0.6051939 -0.6051939 -0.6051939  0.0000000  0.0000000
##   [391] -0.6051939 -0.6051939  0.0000000 -0.6051939  0.0000000  0.0000000
##   [397] -0.6051939  0.0000000  0.0000000  0.0000000 -0.6051939 -0.6051939
##   [403] -0.6051939 -0.6051939 -0.6051939  0.0000000  0.0000000 -0.6051939
##   [409] -0.6051939 -0.6051939 -0.6051939  0.0000000 -0.6051939 -0.6051939
##   [415] -0.6051939 -0.6051939  0.0000000 -0.6051939 -0.6051939 -0.6051939
##   [421]  0.0000000 -0.6051939 -0.6051939 -0.6051939 -0.6051939  0.0000000
##   [427]  0.0000000 -0.6051939 -0.6051939 -0.6051939  0.0000000 -0.6051939
##   [433] -0.6051939 -0.6051939  0.0000000  0.0000000 -0.6051939 -0.6051939
##   [439] -0.6051939 -0.6051939 -0.6051939 -0.6051939 -0.6051939 -0.6051939
##   [445] -0.6051939 -0.6051939 -0.6051939 -0.6051939 -0.6051939 -0.6051939
##   [451] -0.6051939 -0.6051939  0.0000000 -0.6051939 -0.6051939 -0.6051939
##   [457]  0.0000000 -0.6051939 -0.6051939 -0.6051939 -0.6051939 -0.6051939
##   [463] -0.6051939  0.0000000  0.0000000  0.0000000  0.0000000 -0.6051939
##   [469]  0.0000000  0.0000000 -0.6051939 -0.6051939 -0.6051939 -0.6051939
##   [475]  0.0000000 -0.6051939 -0.6051939  0.0000000 -0.6051939 -0.6051939
##   [481] -0.6051939 -0.6051939 -0.6051939 -0.6051939  0.0000000 -0.6051939
##   [487] -0.6051939 -0.6051939  0.0000000 -0.6051939 -0.6051939  0.0000000
##   [493] -0.6051939 -0.6051939 -0.6051939 -0.6051939 -0.6051939  0.0000000
##   [499] -0.6051939 -0.6051939 -0.6051939 -0.6051939 -0.6051939 -0.6051939
##   [505] -0.6051939 -0.6051939 -0.6051939 -0.6051939 -0.6051939 -0.6051939
##   [511] -0.6051939 -0.6051939 -0.6051939  0.0000000  0.0000000 -0.6051939
##   [517] -0.6051939 -0.6051939 -0.6051939 -0.6051939 -0.6051939 -0.6051939
##   [523] -0.6051939 -0.6051939 -0.6051939 -0.6051939 -0.6051939  0.0000000
##   [529] -0.6051939 -0.6051939 -0.6051939 -0.6051939  0.0000000 -0.6051939
```

```
## [535] -0.6051939 -0.6051939  0.0000000  0.0000000 -0.6051939 -0.6051939
## [541] -0.6051939  0.0000000 -0.6051939 -0.6051939  0.0000000  0.0000000
## [547] -0.6051939 -0.6051939 -0.6051939 -0.6051939 -0.6051939  0.0000000
## [553] -0.6051939  0.0000000 -0.6051939 -0.6051939 -0.6051939 -0.6051939
## [559] -0.6051939 -0.6051939  0.0000000 -0.6051939  0.0000000 -0.6051939
## [565]  0.0000000 -0.6051939  0.0000000  0.0000000 -0.6051939 -0.6051939
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## [1969] -0.6051939 -0.6051939 -0.6051939 -0.6051939 -0.6051939  0.0000000
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## [2011] -0.6051939 -0.6051939 -0.6051939 -0.6051939  0.0000000 -0.6051939
## [2017]  0.0000000 -0.6051939 -0.6051939 -0.6051939 -0.6051939  0.0000000
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```

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## [2269] -0.6051939 -0.6051939   0.0000000 -0.6051939 -0.6051939 -0.6051939
## [2275]   0.0000000 -0.6051939 -0.6051939 -0.6051939 -0.6051939 -0.6051939
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## [2569]  0.0000000 -0.6051939 -0.6051939  0.0000000 -0.6051939 -0.6051939
## [2575] -0.6051939  0.0000000  0.0000000 -0.6051939  0.0000000 -0.6051939
## [2581] -0.6051939 -0.6051939 -0.6051939  0.0000000  0.0000000 -0.6051939
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## [2599] -0.6051939 -0.6051939 -0.6051939 -0.6051939 -0.6051939 -0.6051939
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## [2617] -0.6051939  0.0000000 -0.6051939 -0.6051939 -0.6051939  0.0000000
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## [2665] -0.6051939 -0.6051939 -0.6051939 -0.6051939  0.0000000  0.0000000
## [2671] -0.6051939 -0.6051939  0.0000000 -0.6051939 -0.6051939 -0.6051939
## [2677]  0.0000000 -0.6051939  0.0000000 -0.6051939  0.0000000 -0.6051939
## [2683]  0.0000000  0.0000000 -0.6051939 -0.6051939  0.0000000 -0.6051939
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## [2695] -0.6051939 -0.6051939 -0.6051939 -0.6051939 -0.6051939 -0.6051939
## [2701] -0.6051939 -0.6051939 -0.6051939 -0.6051939 -0.6051939  0.0000000
## [2707] -0.6051939 -0.6051939 -0.6051939 -0.6051939 -0.6051939 -0.6051939
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## [2731] -0.6051939 -0.6051939 -0.6051939 -0.6051939 -0.6051939 -0.6051939
## [2737]  0.0000000 -0.6051939 -0.6051939 -0.6051939 -0.6051939  0.0000000
```

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## [2743] -0.6051939 -0.6051939 -0.6051939 -0.6051939 -0.6051939  0.0000000
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## [2767]  0.0000000 -0.6051939  0.0000000 -0.6051939  0.0000000  0.0000000
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## [2839] -0.6051939 -0.6051939 -0.6051939 -0.6051939 -0.6051939 -0.6051939
## [2845] -0.6051939 -0.6051939  0.0000000 -0.6051939 -0.6051939 -0.6051939
## [2851] -0.6051939  0.0000000 -0.6051939 -0.6051939 -0.6051939 -0.6051939
## [2857]  0.0000000 -0.6051939 -0.6051939 -0.6051939 -0.6051939 -0.6051939
## [2863] -0.6051939 -0.6051939 -0.6051939 -0.6051939 -0.6051939 -0.6051939
## [2869] -0.6051939  0.0000000 -0.6051939  0.0000000 -0.6051939 -0.6051939
## [2875] -0.6051939 -0.6051939 -0.6051939 -0.6051939 -0.6051939 -0.6051939
## [2881] -0.6051939 -0.6051939 -0.6051939  0.0000000  0.0000000 -0.6051939
## [2887] -0.6051939 -0.6051939 -0.6051939  0.0000000 -0.6051939 -0.6051939
## [2893] -0.6051939 -0.6051939 -0.6051939 -0.6051939 -0.6051939 -0.6051939
## [2899] -0.6051939 -0.6051939 -0.6051939  0.0000000 -0.6051939 -0.6051939
## [2905] -0.6051939 -0.6051939 -0.6051939 -0.6051939  0.0000000 -0.6051939
## [2911]  0.0000000 -0.6051939 -0.6051939  0.0000000 -0.6051939  0.0000000
## [2917] -0.6051939 -0.6051939 -0.6051939  0.0000000 -0.6051939 -0.6051939
## [2923] -0.6051939 -0.6051939  0.0000000 -0.6051939 -0.6051939 -0.6051939
## [2929] -0.6051939 -0.6051939  0.0000000 -0.6051939 -0.6051939  0.0000000
## [2935] -0.6051939 -0.6051939 -0.6051939  0.0000000 -0.6051939 -0.6051939
## [2941] -0.6051939 -0.6051939 -0.6051939 -0.6051939 -0.6051939  0.0000000
## [2947] -0.6051939 -0.6051939 -0.6051939 -0.6051939 -0.6051939 -0.6051939
## [2953] -0.6051939 -0.6051939  0.0000000  0.0000000 -0.6051939 -0.6051939
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## [2965] -0.6051939 -0.6051939 -0.6051939 -0.6051939 -0.6051939 -0.6051939
## [2971] -0.6051939 -0.6051939 -0.6051939 -0.6051939 -0.6051939 -0.6051939
## [2977] -0.6051939 -0.6051939  0.0000000 -0.6051939 -0.6051939  0.0000000
```

```
                                        -0.458345796*(rotterdam$size=="20-50")
```

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##    [7]  0.0000000  0.0000000  0.0000000 -0.4583458 -0.4583458  0.0000000
```

```
##    [13] -0.4583458  0.0000000  0.0000000  0.0000000 -0.4583458 -0.4583458
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##    [25]  0.0000000  0.0000000  0.0000000  0.0000000 -0.4583458  0.0000000
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##    [43]  0.0000000  0.0000000 -0.4583458 -0.4583458  0.0000000 -0.4583458
##    [49]  0.0000000 -0.4583458 -0.4583458 -0.4583458  0.0000000  0.0000000
##    [55]  0.0000000 -0.4583458  0.0000000 -0.4583458  0.0000000  0.0000000
##    [61]  0.0000000 -0.4583458  0.0000000 -0.4583458 -0.4583458  0.0000000
##    [67] -0.4583458  0.0000000  0.0000000 -0.4583458 -0.4583458  0.0000000
##    [73] -0.4583458  0.0000000 -0.4583458  0.0000000  0.0000000 -0.4583458
##    [79]  0.0000000  0.0000000  0.0000000 -0.4583458 -0.4583458 -0.4583458
##    [85]  0.0000000  0.0000000 -0.4583458  0.0000000  0.0000000  0.0000000
##    [91]  0.0000000  0.0000000  0.0000000 -0.4583458  0.0000000 -0.4583458
##    [97]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
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##   [109]  0.0000000  0.0000000 -0.4583458 -0.4583458 -0.4583458 -0.4583458
##   [115] -0.4583458  0.0000000 -0.4583458  0.0000000 -0.4583458 -0.4583458
##   [121]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
##   [127] -0.4583458  0.0000000 -0.4583458  0.0000000  0.0000000 -0.4583458
##   [133]  0.0000000 -0.4583458  0.0000000 -0.4583458 -0.4583458 -0.4583458
##   [139] -0.4583458  0.0000000  0.0000000 -0.4583458  0.0000000  0.0000000
##   [145]  0.0000000  0.0000000  0.0000000 -0.4583458  0.0000000 -0.4583458
##   [151] -0.4583458  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
##   [157] -0.4583458  0.0000000 -0.4583458 -0.4583458  0.0000000  0.0000000
##   [163]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
##   [169] -0.4583458  0.0000000  0.0000000 -0.4583458 -0.4583458  0.0000000
##   [175]  0.0000000  0.0000000 -0.4583458  0.0000000  0.0000000  0.0000000
##   [181]  0.0000000 -0.4583458 -0.4583458  0.0000000  0.0000000  0.0000000
##   [187]  0.0000000  0.0000000  0.0000000 -0.4583458  0.0000000  0.0000000
##   [193]  0.0000000  0.0000000  0.0000000 -0.4583458 -0.4583458 -0.4583458
##   [199]  0.0000000  0.0000000  0.0000000 -0.4583458 -0.4583458  0.0000000
##   [205]  0.0000000 -0.4583458  0.0000000 -0.4583458  0.0000000 -0.4583458
##   [211]  0.0000000 -0.4583458  0.0000000  0.0000000  0.0000000  0.0000000
##   [217]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000 -0.4583458
##   [223]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000 -0.4583458
##   [229]  0.0000000  0.0000000  0.0000000  0.0000000 -0.4583458  0.0000000
##   [235]  0.0000000  0.0000000  0.0000000  0.0000000 -0.4583458  0.0000000
##   [241] -0.4583458  0.0000000 -0.4583458 -0.4583458 -0.4583458 -0.4583458
##   [247]  0.0000000 -0.4583458  0.0000000  0.0000000  0.0000000  0.0000000
##   [253]  0.0000000 -0.4583458 -0.4583458 -0.4583458  0.0000000 -0.4583458
##   [259] -0.4583458  0.0000000 -0.4583458 -0.4583458  0.0000000 -0.4583458
##   [265]  0.0000000 -0.4583458  0.0000000  0.0000000 -0.4583458  0.0000000
##   [271]  0.0000000 -0.4583458 -0.4583458  0.0000000 -0.4583458  0.0000000
##   [277] -0.4583458  0.0000000  0.0000000  0.0000000  0.0000000 -0.4583458
##   [283]  0.0000000  0.0000000 -0.4583458  0.0000000 -0.4583458  0.0000000
```

```
## [289]   0.0000000   0.0000000   0.0000000   0.0000000   0.0000000   0.0000000
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## [301]   0.0000000  -0.4583458   0.0000000   0.0000000  -0.4583458  -0.4583458
## [307]   0.0000000   0.0000000   0.0000000  -0.4583458   0.0000000  -0.4583458
## [313]   0.0000000   0.0000000  -0.4583458   0.0000000   0.0000000  -0.4583458
## [319]   0.0000000   0.0000000  -0.4583458   0.0000000   0.0000000   0.0000000
## [325]   0.0000000   0.0000000   0.0000000   0.0000000   0.0000000   0.0000000
## [331]  -0.4583458  -0.4583458   0.0000000   0.0000000   0.0000000   0.0000000
## [337]  -0.4583458   0.0000000  -0.4583458  -0.4583458   0.0000000  -0.4583458
## [343]   0.0000000  -0.4583458   0.0000000   0.0000000  -0.4583458   0.0000000
## [349]   0.0000000  -0.4583458  -0.4583458  -0.4583458   0.0000000  -0.4583458
## [355]   0.0000000  -0.4583458   0.0000000   0.0000000   0.0000000  -0.4583458
## [361]   0.0000000  -0.4583458   0.0000000   0.0000000   0.0000000   0.0000000
## [367]   0.0000000   0.0000000   0.0000000  -0.4583458   0.0000000  -0.4583458
## [373]   0.0000000   0.0000000   0.0000000   0.0000000  -0.4583458   0.0000000
## [379]   0.0000000   0.0000000   0.0000000   0.0000000   0.0000000  -0.4583458
## [385]   0.0000000  -0.4583458  -0.4583458  -0.4583458  -0.4583458   0.0000000
## [391]   0.0000000   0.0000000  -0.4583458  -0.4583458   0.0000000   0.0000000
## [397]   0.0000000  -0.4583458  -0.4583458   0.0000000  -0.4583458   0.0000000
## [403]   0.0000000  -0.4583458   0.0000000  -0.4583458  -0.4583458  -0.4583458
## [409]  -0.4583458   0.0000000   0.0000000  -0.4583458   0.0000000   0.0000000
## [415]   0.0000000   0.0000000  -0.4583458   0.0000000   0.0000000   0.0000000
## [421]   0.0000000  -0.4583458   0.0000000  -0.4583458   0.0000000   0.0000000
## [427]   0.0000000   0.0000000   0.0000000  -0.4583458   0.0000000  -0.4583458
## [433]   0.0000000  -0.4583458  -0.4583458  -0.4583458  -0.4583458   0.0000000
## [439]   0.0000000   0.0000000   0.0000000   0.0000000   0.0000000  -0.4583458
## [445]   0.0000000   0.0000000  -0.4583458  -0.4583458   0.0000000  -0.4583458
## [451]   0.0000000  -0.4583458   0.0000000   0.0000000  -0.4583458   0.0000000
## [457]  -0.4583458   0.0000000   0.0000000   0.0000000  -0.4583458  -0.4583458
## [463]   0.0000000  -0.4583458  -0.4583458  -0.4583458   0.0000000   0.0000000
## [469]  -0.4583458   0.0000000   0.0000000   0.0000000   0.0000000  -0.4583458
## [475]  -0.4583458   0.0000000   0.0000000   0.0000000   0.0000000  -0.4583458
## [481]   0.0000000   0.0000000   0.0000000   0.0000000  -0.4583458  -0.4583458
## [487]  -0.4583458  -0.4583458   0.0000000   0.0000000   0.0000000   0.0000000
## [493]  -0.4583458   0.0000000   0.0000000   0.0000000   0.0000000   0.0000000
## [499]   0.0000000   0.0000000   0.0000000  -0.4583458   0.0000000   0.0000000
## [505]   0.0000000   0.0000000  -0.4583458   0.0000000   0.0000000   0.0000000
## [511]   0.0000000   0.0000000  -0.4583458   0.0000000   0.0000000   0.0000000
## [517]   0.0000000   0.0000000  -0.4583458  -0.4583458   0.0000000   0.0000000
## [523]  -0.4583458   0.0000000   0.0000000   0.0000000   0.0000000   0.0000000
## [529]   0.0000000   0.0000000  -0.4583458  -0.4583458   0.0000000  -0.4583458
## [535]   0.0000000   0.0000000   0.0000000   0.0000000  -0.4583458  -0.4583458
## [541]   0.0000000   0.0000000   0.0000000  -0.4583458  -0.4583458  -0.4583458
## [547]   0.0000000   0.0000000   0.0000000   0.0000000   0.0000000   0.0000000
## [553]  -0.4583458  -0.4583458   0.0000000   0.0000000  -0.4583458   0.0000000
## [559]  -0.4583458   0.0000000  -0.4583458   0.0000000   0.0000000   0.0000000
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## [565] -0.4583458  0.0000000  0.0000000  0.0000000 -0.4583458  0.0000000
## [571] -0.4583458 -0.4583458 -0.4583458 -0.4583458  0.0000000 -0.4583458
## [577]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [583] -0.4583458  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [589] -0.4583458  0.0000000  0.0000000 -0.4583458 -0.4583458 -0.4583458
## [595]  0.0000000  0.0000000 -0.4583458 -0.4583458 -0.4583458 -0.4583458
## [601] -0.4583458  0.0000000 -0.4583458 -0.4583458  0.0000000 -0.4583458
## [607] -0.4583458 -0.4583458 -0.4583458  0.0000000 -0.4583458  0.0000000
## [613]  0.0000000  0.0000000 -0.4583458 -0.4583458  0.0000000  0.0000000
## [619]  0.0000000 -0.4583458 -0.4583458  0.0000000  0.0000000 -0.4583458
## [625]  0.0000000  0.0000000 -0.4583458  0.0000000  0.0000000  0.0000000
## [631]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000 -0.4583458
## [637] -0.4583458 -0.4583458  0.0000000 -0.4583458  0.0000000  0.0000000
## [643]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000 -0.4583458
## [649] -0.4583458  0.0000000  0.0000000  0.0000000 -0.4583458 -0.4583458
## [655]  0.0000000  0.0000000 -0.4583458 -0.4583458 -0.4583458  0.0000000
## [661]  0.0000000 -0.4583458 -0.4583458 -0.4583458  0.0000000 -0.4583458
## [667] -0.4583458 -0.4583458 -0.4583458  0.0000000 -0.4583458  0.0000000
## [673]  0.0000000 -0.4583458  0.0000000 -0.4583458 -0.4583458 -0.4583458
## [679]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [685] -0.4583458 -0.4583458 -0.4583458  0.0000000  0.0000000 -0.4583458
## [691]  0.0000000  0.0000000 -0.4583458  0.0000000 -0.4583458  0.0000000
## [697]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [703] -0.4583458  0.0000000  0.0000000 -0.4583458 -0.4583458  0.0000000
## [709]  0.0000000  0.0000000  0.0000000 -0.4583458  0.0000000  0.0000000
## [715]  0.0000000  0.0000000 -0.4583458  0.0000000  0.0000000  0.0000000
## [721]  0.0000000 -0.4583458  0.0000000 -0.4583458  0.0000000  0.0000000
## [727] -0.4583458  0.0000000 -0.4583458  0.0000000  0.0000000  0.0000000
## [733] -0.4583458  0.0000000  0.0000000  0.0000000  0.0000000 -0.4583458
## [739] -0.4583458 -0.4583458 -0.4583458  0.0000000  0.0000000  0.0000000
## [745]  0.0000000  0.0000000  0.0000000 -0.4583458  0.0000000 -0.4583458
## [751]  0.0000000  0.0000000  0.0000000 -0.4583458  0.0000000  0.0000000
## [757]  0.0000000  0.0000000 -0.4583458  0.0000000 -0.4583458  0.0000000
## [763]  0.0000000 -0.4583458  0.0000000  0.0000000 -0.4583458  0.0000000
## [769] -0.4583458  0.0000000 -0.4583458 -0.4583458  0.0000000  0.0000000
## [775] -0.4583458  0.0000000 -0.4583458  0.0000000 -0.4583458  0.0000000
## [781]  0.0000000  0.0000000  0.0000000  0.0000000 -0.4583458  0.0000000
## [787] -0.4583458  0.0000000  0.0000000  0.0000000  0.0000000 -0.4583458
## [793] -0.4583458  0.0000000 -0.4583458  0.0000000  0.0000000  0.0000000
## [799]  0.0000000 -0.4583458  0.0000000 -0.4583458 -0.4583458  0.0000000
## [805]  0.0000000 -0.4583458  0.0000000  0.0000000 -0.4583458 -0.4583458
## [811] -0.4583458  0.0000000 -0.4583458  0.0000000 -0.4583458 -0.4583458
## [817] -0.4583458 -0.4583458  0.0000000 -0.4583458 -0.4583458  0.0000000
## [823] -0.4583458  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [829]  0.0000000  0.0000000 -0.4583458 -0.4583458  0.0000000 -0.4583458
## [835] -0.4583458 -0.4583458  0.0000000  0.0000000 -0.4583458  0.0000000
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##  [841] -0.4583458  0.0000000  0.0000000  0.0000000 -0.4583458  0.0000000
##  [847] -0.4583458  0.0000000  0.0000000 -0.4583458 -0.4583458  0.0000000
##  [853]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000 -0.4583458
##  [859] -0.4583458  0.0000000  0.0000000  0.0000000 -0.4583458  0.0000000
##  [865] -0.4583458  0.0000000  0.0000000 -0.4583458  0.0000000  0.0000000
##  [871] -0.4583458 -0.4583458  0.0000000 -0.4583458  0.0000000 -0.4583458
##  [877] -0.4583458  0.0000000  0.0000000  0.0000000  0.0000000 -0.4583458
##  [883] -0.4583458  0.0000000  0.0000000  0.0000000 -0.4583458  0.0000000
##  [889]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000 -0.4583458
##  [895]  0.0000000  0.0000000 -0.4583458  0.0000000 -0.4583458  0.0000000
##  [901] -0.4583458 -0.4583458 -0.4583458 -0.4583458  0.0000000 -0.4583458
##  [907] -0.4583458  0.0000000  0.0000000  0.0000000  0.0000000 -0.4583458
##  [913] -0.4583458  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
##  [919]  0.0000000 -0.4583458  0.0000000  0.0000000  0.0000000  0.0000000
##  [925]  0.0000000 -0.4583458 -0.4583458 -0.4583458  0.0000000  0.0000000
##  [931]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
##  [937]  0.0000000  0.0000000  0.0000000 -0.4583458  0.0000000 -0.4583458
##  [943]  0.0000000  0.0000000 -0.4583458  0.0000000 -0.4583458  0.0000000
##  [949] -0.4583458 -0.4583458  0.0000000  0.0000000  0.0000000  0.0000000
##  [955]  0.0000000  0.0000000 -0.4583458  0.0000000  0.0000000 -0.4583458
##  [961]  0.0000000 -0.4583458 -0.4583458  0.0000000  0.0000000 -0.4583458
##  [967] -0.4583458  0.0000000  0.0000000  0.0000000 -0.4583458 -0.4583458
##  [973]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000 -0.4583458
##  [979]  0.0000000 -0.4583458 -0.4583458 -0.4583458  0.0000000 -0.4583458
##  [985]  0.0000000 -0.4583458  0.0000000  0.0000000 -0.4583458  0.0000000
##  [991]  0.0000000  0.0000000 -0.4583458  0.0000000  0.0000000 -0.4583458
##  [997]  0.0000000  0.0000000 -0.4583458 -0.4583458  0.0000000 -0.4583458
## [1003] -0.4583458  0.0000000  0.0000000  0.0000000  0.0000000 -0.4583458
## [1009] -0.4583458 -0.4583458 -0.4583458  0.0000000  0.0000000 -0.4583458
## [1015]  0.0000000  0.0000000  0.0000000  0.0000000 -0.4583458 -0.4583458
## [1021] -0.4583458 -0.4583458  0.0000000  0.0000000 -0.4583458  0.0000000
## [1027]  0.0000000 -0.4583458 -0.4583458  0.0000000 -0.4583458  0.0000000
## [1033] -0.4583458  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [1039]  0.0000000 -0.4583458  0.0000000  0.0000000 -0.4583458 -0.4583458
## [1045]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [1051]  0.0000000 -0.4583458  0.0000000 -0.4583458  0.0000000  0.0000000
## [1057]  0.0000000 -0.4583458 -0.4583458  0.0000000 -0.4583458  0.0000000
## [1063]  0.0000000  0.0000000  0.0000000 -0.4583458 -0.4583458  0.0000000
## [1069]  0.0000000 -0.4583458  0.0000000 -0.4583458  0.0000000  0.0000000
## [1075]  0.0000000  0.0000000  0.0000000 -0.4583458  0.0000000 -0.4583458
## [1081] -0.4583458  0.0000000 -0.4583458  0.0000000  0.0000000  0.0000000
## [1087] -0.4583458 -0.4583458  0.0000000 -0.4583458  0.0000000  0.0000000
## [1093]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [1099] -0.4583458  0.0000000  0.0000000 -0.4583458  0.0000000 -0.4583458
## [1105] -0.4583458 -0.4583458  0.0000000  0.0000000 -0.4583458  0.0000000
## [1111] -0.4583458 -0.4583458 -0.4583458 -0.4583458 -0.4583458  0.0000000
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## [1117]  0.0000000  0.0000000  0.0000000  0.0000000 -0.4583458  0.0000000
## [1123]  0.0000000 -0.4583458  0.0000000 -0.4583458  0.0000000  0.0000000
## [1129] -0.4583458  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [1135]  0.0000000  0.0000000  0.0000000  0.0000000 -0.4583458 -0.4583458
## [1141] -0.4583458  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [1147]  0.0000000  0.0000000 -0.4583458 -0.4583458  0.0000000  0.0000000
## [1153]  0.0000000  0.0000000 -0.4583458 -0.4583458  0.0000000 -0.4583458
## [1159]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000 -0.4583458
## [1165] -0.4583458  0.0000000  0.0000000 -0.4583458  0.0000000 -0.4583458
## [1171] -0.4583458  0.0000000 -0.4583458  0.0000000 -0.4583458 -0.4583458
## [1177]  0.0000000  0.0000000 -0.4583458  0.0000000  0.0000000  0.0000000
## [1183]  0.0000000  0.0000000 -0.4583458  0.0000000 -0.4583458 -0.4583458
## [1189]  0.0000000 -0.4583458  0.0000000  0.0000000  0.0000000  0.0000000
## [1195]  0.0000000 -0.4583458  0.0000000  0.0000000 -0.4583458 -0.4583458
## [1201]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [1207]  0.0000000 -0.4583458  0.0000000  0.0000000 -0.4583458  0.0000000
## [1213]  0.0000000 -0.4583458  0.0000000  0.0000000  0.0000000  0.0000000
## [1219]  0.0000000 -0.4583458  0.0000000  0.0000000 -0.4583458  0.0000000
## [1225]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [1231]  0.0000000  0.0000000  0.0000000 -0.4583458 -0.4583458 -0.4583458
## [1237]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [1243]  0.0000000 -0.4583458  0.0000000  0.0000000  0.0000000  0.0000000
## [1249] -0.4583458  0.0000000  0.0000000 -0.4583458  0.0000000 -0.4583458
## [1255]  0.0000000 -0.4583458  0.0000000 -0.4583458  0.0000000  0.0000000
## [1261]  0.0000000 -0.4583458 -0.4583458  0.0000000  0.0000000 -0.4583458
## [1267]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [1273]  0.0000000  0.0000000  0.0000000  0.0000000 -0.4583458  0.0000000
## [1279]  0.0000000  0.0000000 -0.4583458  0.0000000  0.0000000 -0.4583458
## [1285]  0.0000000 -0.4583458  0.0000000  0.0000000  0.0000000  0.0000000
## [1291] -0.4583458  0.0000000 -0.4583458 -0.4583458  0.0000000 -0.4583458
## [1297] -0.4583458 -0.4583458  0.0000000  0.0000000 -0.4583458 -0.4583458
## [1303]  0.0000000 -0.4583458  0.0000000  0.0000000 -0.4583458 -0.4583458
## [1309]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [1315]  0.0000000 -0.4583458 -0.4583458  0.0000000 -0.4583458  0.0000000
## [1321] -0.4583458  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [1327] -0.4583458 -0.4583458  0.0000000  0.0000000  0.0000000  0.0000000
## [1333] -0.4583458 -0.4583458 -0.4583458  0.0000000  0.0000000 -0.4583458
## [1339]  0.0000000 -0.4583458  0.0000000  0.0000000 -0.4583458 -0.4583458
## [1345]  0.0000000  0.0000000 -0.4583458 -0.4583458  0.0000000  0.0000000
## [1351]  0.0000000  0.0000000 -0.4583458 -0.4583458  0.0000000 -0.4583458
## [1357]  0.0000000  0.0000000  0.0000000  0.0000000 -0.4583458  0.0000000
## [1363]  0.0000000 -0.4583458 -0.4583458  0.0000000 -0.4583458 -0.4583458
## [1369]  0.0000000 -0.4583458 -0.4583458  0.0000000  0.0000000  0.0000000
## [1375]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000 -0.4583458
## [1381] -0.4583458 -0.4583458  0.0000000  0.0000000  0.0000000  0.0000000
## [1387]  0.0000000 -0.4583458 -0.4583458 -0.4583458  0.0000000 -0.4583458
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## [1393] -0.4583458  0.0000000  0.0000000 -0.4583458  0.0000000 -0.4583458
## [1399]  0.0000000 -0.4583458 -0.4583458 -0.4583458  0.0000000  0.0000000
## [1405]  0.0000000 -0.4583458  0.0000000 -0.4583458 -0.4583458  0.0000000
## [1411] -0.4583458  0.0000000 -0.4583458  0.0000000  0.0000000  0.0000000
## [1417] -0.4583458 -0.4583458  0.0000000 -0.4583458 -0.4583458  0.0000000
## [1423]  0.0000000  0.0000000 -0.4583458 -0.4583458  0.0000000  0.0000000
## [1429] -0.4583458  0.0000000 -0.4583458 -0.4583458  0.0000000  0.0000000
## [1435] -0.4583458 -0.4583458  0.0000000 -0.4583458  0.0000000  0.0000000
## [1441] -0.4583458 -0.4583458  0.0000000  0.0000000  0.0000000 -0.4583458
## [1447]  0.0000000  0.0000000 -0.4583458  0.0000000  0.0000000 -0.4583458
## [1453]  0.0000000 -0.4583458 -0.4583458  0.0000000  0.0000000  0.0000000
## [1459]  0.0000000  0.0000000 -0.4583458  0.0000000 -0.4583458  0.0000000
## [1465]  0.0000000 -0.4583458 -0.4583458  0.0000000 -0.4583458  0.0000000
## [1471] -0.4583458 -0.4583458  0.0000000 -0.4583458  0.0000000  0.0000000
## [1477]  0.0000000  0.0000000 -0.4583458  0.0000000 -0.4583458  0.0000000
## [1483] -0.4583458  0.0000000  0.0000000 -0.4583458 -0.4583458  0.0000000
## [1489] -0.4583458  0.0000000  0.0000000  0.0000000 -0.4583458 -0.4583458
## [1495] -0.4583458  0.0000000 -0.4583458 -0.4583458 -0.4583458  0.0000000
## [1501] -0.4583458  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [1507]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000 -0.4583458
## [1513]  0.0000000  0.0000000  0.0000000  0.0000000 -0.4583458 -0.4583458
## [1519]  0.0000000  0.0000000 -0.4583458  0.0000000  0.0000000  0.0000000
## [1525] -0.4583458  0.0000000 -0.4583458  0.0000000  0.0000000  0.0000000
## [1531]  0.0000000 -0.4583458  0.0000000 -0.4583458 -0.4583458 -0.4583458
## [1537]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [1543]  0.0000000  0.0000000  0.0000000  0.0000000 -0.4583458 -0.4583458
## [1549] -0.4583458  0.0000000  0.0000000 -0.4583458  0.0000000 -0.4583458
## [1555]  0.0000000 -0.4583458  0.0000000  0.0000000  0.0000000  0.0000000
## [1561]  0.0000000  0.0000000  0.0000000  0.0000000 -0.4583458 -0.4583458
## [1567] -0.4583458 -0.4583458  0.0000000 -0.4583458 -0.4583458 -0.4583458
## [1573]  0.0000000  0.0000000  0.0000000 -0.4583458  0.0000000  0.0000000
## [1579]  0.0000000 -0.4583458  0.0000000  0.0000000  0.0000000 -0.4583458
## [1585] -0.4583458  0.0000000 -0.4583458  0.0000000  0.0000000  0.0000000
## [1591] -0.4583458  0.0000000 -0.4583458 -0.4583458  0.0000000 -0.4583458
## [1597]  0.0000000 -0.4583458  0.0000000  0.0000000 -0.4583458 -0.4583458
## [1603] -0.4583458  0.0000000 -0.4583458 -0.4583458 -0.4583458 -0.4583458
## [1609] -0.4583458 -0.4583458  0.0000000 -0.4583458  0.0000000  0.0000000
## [1615] -0.4583458  0.0000000  0.0000000 -0.4583458 -0.4583458 -0.4583458
## [1621]  0.0000000  0.0000000 -0.4583458  0.0000000  0.0000000 -0.4583458
## [1627] -0.4583458  0.0000000  0.0000000 -0.4583458  0.0000000  0.0000000
## [1633] -0.4583458 -0.4583458 -0.4583458  0.0000000 -0.4583458  0.0000000
## [1639] -0.4583458 -0.4583458 -0.4583458 -0.4583458 -0.4583458  0.0000000
## [1645]  0.0000000  0.0000000  0.0000000  0.0000000 -0.4583458  0.0000000
## [1651]  0.0000000 -0.4583458  0.0000000 -0.4583458  0.0000000 -0.4583458
## [1657]  0.0000000  0.0000000 -0.4583458 -0.4583458  0.0000000  0.0000000
## [1663]  0.0000000  0.0000000 -0.4583458  0.0000000 -0.4583458 -0.4583458
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## [1669] -0.4583458  0.0000000  0.0000000  0.0000000 -0.4583458  0.0000000
## [1675] -0.4583458 -0.4583458  0.0000000 -0.4583458 -0.4583458  0.0000000
## [1681]  0.0000000 -0.4583458 -0.4583458 -0.4583458  0.0000000 -0.4583458
## [1687] -0.4583458 -0.4583458  0.0000000 -0.4583458  0.0000000 -0.4583458
## [1693] -0.4583458  0.0000000  0.0000000  0.0000000  0.0000000 -0.4583458
## [1699] -0.4583458 -0.4583458 -0.4583458 -0.4583458 -0.4583458  0.0000000
## [1705] -0.4583458  0.0000000  0.0000000  0.0000000 -0.4583458 -0.4583458
## [1711] -0.4583458 -0.4583458 -0.4583458  0.0000000  0.0000000  0.0000000
## [1717] -0.4583458  0.0000000  0.0000000  0.0000000 -0.4583458 -0.4583458
## [1723]  0.0000000  0.0000000  0.0000000  0.0000000 -0.4583458 -0.4583458
## [1729]  0.0000000  0.0000000  0.0000000  0.0000000 -0.4583458 -0.4583458
## [1735]  0.0000000 -0.4583458 -0.4583458  0.0000000 -0.4583458 -0.4583458
## [1741]  0.0000000  0.0000000  0.0000000 -0.4583458  0.0000000  0.0000000
## [1747]  0.0000000  0.0000000 -0.4583458 -0.4583458  0.0000000  0.0000000
## [1753] -0.4583458 -0.4583458 -0.4583458 -0.4583458  0.0000000  0.0000000
## [1759] -0.4583458 -0.4583458 -0.4583458  0.0000000 -0.4583458  0.0000000
## [1765] -0.4583458  0.0000000  0.0000000  0.0000000  0.0000000 -0.4583458
## [1771] -0.4583458  0.0000000  0.0000000 -0.4583458  0.0000000  0.0000000
## [1777] -0.4583458  0.0000000  0.0000000  0.0000000  0.0000000 -0.4583458
## [1783] -0.4583458 -0.4583458 -0.4583458 -0.4583458 -0.4583458  0.0000000
## [1789] -0.4583458  0.0000000  0.0000000 -0.4583458 -0.4583458 -0.4583458
## [1795]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [1801] -0.4583458  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [1807] -0.4583458 -0.4583458 -0.4583458 -0.4583458  0.0000000 -0.4583458
## [1813]  0.0000000  0.0000000  0.0000000 -0.4583458 -0.4583458 -0.4583458
## [1819]  0.0000000  0.0000000 -0.4583458 -0.4583458  0.0000000 -0.4583458
## [1825] -0.4583458  0.0000000 -0.4583458 -0.4583458 -0.4583458 -0.4583458
## [1831]  0.0000000  0.0000000  0.0000000  0.0000000 -0.4583458  0.0000000
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## [1843] -0.4583458  0.0000000  0.0000000 -0.4583458  0.0000000 -0.4583458
## [1849]  0.0000000 -0.4583458  0.0000000 -0.4583458  0.0000000 -0.4583458
## [1855]  0.0000000 -0.4583458  0.0000000 -0.4583458  0.0000000  0.0000000
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## [1873]  0.0000000 -0.4583458  0.0000000 -0.4583458  0.0000000  0.0000000
## [1879] -0.4583458  0.0000000 -0.4583458  0.0000000  0.0000000  0.0000000
## [1885] -0.4583458  0.0000000 -0.4583458  0.0000000  0.0000000  0.0000000
## [1891] -0.4583458  0.0000000 -0.4583458  0.0000000  0.0000000 -0.4583458
## [1897]  0.0000000  0.0000000  0.0000000 -0.4583458  0.0000000  0.0000000
## [1903] -0.4583458 -0.4583458 -0.4583458 -0.4583458 -0.4583458  0.0000000
## [1909]  0.0000000 -0.4583458 -0.4583458 -0.4583458 -0.4583458 -0.4583458
## [1915]  0.0000000  0.0000000  0.0000000 -0.4583458 -0.4583458 -0.4583458
## [1921]  0.0000000 -0.4583458 -0.4583458 -0.4583458  0.0000000 -0.4583458
## [1927] -0.4583458 -0.4583458 -0.4583458 -0.4583458  0.0000000 -0.4583458
## [1933] -0.4583458  0.0000000  0.0000000  0.0000000  0.0000000 -0.4583458
## [1939] -0.4583458 -0.4583458  0.0000000  0.0000000 -0.4583458 -0.4583458
```

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## [1945] -0.4583458  0.0000000  0.0000000 -0.4583458 -0.4583458  0.0000000
## [1951]  0.0000000  0.0000000 -0.4583458 -0.4583458 -0.4583458  0.0000000
## [1957]  0.0000000 -0.4583458  0.0000000  0.0000000 -0.4583458 -0.4583458
## [1963] -0.4583458  0.0000000 -0.4583458 -0.4583458 -0.4583458 -0.4583458
## [1969] -0.4583458  0.0000000 -0.4583458 -0.4583458 -0.4583458 -0.4583458
## [1975] -0.4583458 -0.4583458  0.0000000 -0.4583458  0.0000000 -0.4583458
## [1981]  0.0000000  0.0000000  0.0000000 -0.4583458 -0.4583458  0.0000000
## [1987] -0.4583458 -0.4583458  0.0000000  0.0000000  0.0000000 -0.4583458
## [1993]  0.0000000 -0.4583458 -0.4583458 -0.4583458  0.0000000 -0.4583458
## [1999]  0.0000000 -0.4583458  0.0000000 -0.4583458 -0.4583458 -0.4583458
## [2005]  0.0000000 -0.4583458  0.0000000  0.0000000 -0.4583458  0.0000000
## [2011] -0.4583458 -0.4583458 -0.4583458 -0.4583458  0.0000000 -0.4583458
## [2017] -0.4583458 -0.4583458  0.0000000  0.0000000 -0.4583458  0.0000000
## [2023] -0.4583458  0.0000000 -0.4583458  0.0000000  0.0000000 -0.4583458
## [2029] -0.4583458 -0.4583458 -0.4583458 -0.4583458  0.0000000  0.0000000
## [2035]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [2041] -0.4583458  0.0000000 -0.4583458  0.0000000  0.0000000  0.0000000
## [2047]  0.0000000 -0.4583458 -0.4583458  0.0000000 -0.4583458 -0.4583458
## [2053] -0.4583458 -0.4583458  0.0000000  0.0000000 -0.4583458 -0.4583458
## [2059] -0.4583458  0.0000000 -0.4583458  0.0000000 -0.4583458 -0.4583458
## [2065]  0.0000000 -0.4583458  0.0000000  0.0000000  0.0000000 -0.4583458
## [2071] -0.4583458 -0.4583458  0.0000000  0.0000000 -0.4583458  0.0000000
## [2077] -0.4583458  0.0000000  0.0000000  0.0000000 -0.4583458 -0.4583458
## [2083] -0.4583458  0.0000000  0.0000000  0.0000000 -0.4583458 -0.4583458
## [2089] -0.4583458  0.0000000 -0.4583458  0.0000000  0.0000000 -0.4583458
## [2095] -0.4583458  0.0000000  0.0000000 -0.4583458  0.0000000  0.0000000
## [2101] -0.4583458 -0.4583458 -0.4583458  0.0000000  0.0000000  0.0000000
## [2107]  0.0000000  0.0000000  0.0000000  0.0000000 -0.4583458 -0.4583458
## [2113]  0.0000000  0.0000000  0.0000000  0.0000000 -0.4583458  0.0000000
## [2119] -0.4583458 -0.4583458  0.0000000 -0.4583458  0.0000000 -0.4583458
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## [2131]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [2137] -0.4583458 -0.4583458  0.0000000 -0.4583458  0.0000000  0.0000000
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## [2149] -0.4583458  0.0000000 -0.4583458 -0.4583458 -0.4583458 -0.4583458
## [2155] -0.4583458 -0.4583458 -0.4583458 -0.4583458 -0.4583458  0.0000000
## [2161]  0.0000000 -0.4583458 -0.4583458 -0.4583458 -0.4583458 -0.4583458
## [2167] -0.4583458 -0.4583458 -0.4583458 -0.4583458 -0.4583458 -0.4583458
## [2173]  0.0000000  0.0000000  0.0000000  0.0000000 -0.4583458  0.0000000
## [2179] -0.4583458 -0.4583458 -0.4583458 -0.4583458  0.0000000  0.0000000
## [2185]  0.0000000 -0.4583458  0.0000000  0.0000000 -0.4583458  0.0000000
## [2191]  0.0000000 -0.4583458 -0.4583458 -0.4583458  0.0000000 -0.4583458
## [2197]  0.0000000 -0.4583458 -0.4583458 -0.4583458  0.0000000 -0.4583458
## [2203] -0.4583458  0.0000000 -0.4583458  0.0000000  0.0000000 -0.4583458
## [2209] -0.4583458  0.0000000  0.0000000 -0.4583458  0.0000000 -0.4583458
## [2215] -0.4583458  0.0000000  0.0000000 -0.4583458  0.0000000 -0.4583458
```

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## [2221] -0.4583458 -0.4583458  0.0000000  0.0000000 -0.4583458  0.0000000
## [2227]  0.0000000  0.0000000  0.0000000  0.0000000 -0.4583458 -0.4583458
## [2233]  0.0000000  0.0000000 -0.4583458 -0.4583458 -0.4583458  0.0000000
## [2239]  0.0000000  0.0000000  0.0000000 -0.4583458 -0.4583458  0.0000000
## [2245]  0.0000000 -0.4583458  0.0000000  0.0000000 -0.4583458 -0.4583458
## [2251]  0.0000000 -0.4583458 -0.4583458  0.0000000 -0.4583458 -0.4583458
## [2257]  0.0000000  0.0000000 -0.4583458  0.0000000  0.0000000 -0.4583458
## [2263] -0.4583458 -0.4583458  0.0000000  0.0000000 -0.4583458  0.0000000
## [2269]  0.0000000 -0.4583458  0.0000000 -0.4583458 -0.4583458 -0.4583458
## [2275]  0.0000000  0.0000000  0.0000000 -0.4583458 -0.4583458  0.0000000
## [2281]  0.0000000  0.0000000 -0.4583458  0.0000000 -0.4583458  0.0000000
## [2287] -0.4583458 -0.4583458 -0.4583458 -0.4583458  0.0000000  0.0000000
## [2293]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [2299]  0.0000000 -0.4583458 -0.4583458 -0.4583458 -0.4583458 -0.4583458
## [2305] -0.4583458 -0.4583458 -0.4583458 -0.4583458 -0.4583458 -0.4583458
## [2311] -0.4583458  0.0000000  0.0000000 -0.4583458  0.0000000 -0.4583458
## [2317] -0.4583458 -0.4583458 -0.4583458 -0.4583458  0.0000000 -0.4583458
## [2323] -0.4583458 -0.4583458 -0.4583458 -0.4583458 -0.4583458 -0.4583458
## [2329] -0.4583458 -0.4583458 -0.4583458  0.0000000  0.0000000 -0.4583458
## [2335] -0.4583458 -0.4583458 -0.4583458  0.0000000  0.0000000 -0.4583458
## [2341]  0.0000000 -0.4583458  0.0000000 -0.4583458  0.0000000  0.0000000
## [2347] -0.4583458  0.0000000 -0.4583458  0.0000000  0.0000000  0.0000000
## [2353]  0.0000000  0.0000000  0.0000000 -0.4583458 -0.4583458 -0.4583458
## [2359] -0.4583458  0.0000000  0.0000000  0.0000000  0.0000000 -0.4583458
## [2365]  0.0000000  0.0000000 -0.4583458 -0.4583458  0.0000000  0.0000000
## [2371] -0.4583458  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [2377]  0.0000000  0.0000000  0.0000000 -0.4583458  0.0000000  0.0000000
## [2383]  0.0000000  0.0000000 -0.4583458  0.0000000 -0.4583458 -0.4583458
## [2389] -0.4583458  0.0000000 -0.4583458 -0.4583458  0.0000000  0.0000000
## [2395] -0.4583458 -0.4583458 -0.4583458  0.0000000  0.0000000  0.0000000
## [2401]  0.0000000  0.0000000 -0.4583458 -0.4583458  0.0000000 -0.4583458
## [2407] -0.4583458 -0.4583458  0.0000000 -0.4583458  0.0000000  0.0000000
## [2413] -0.4583458  0.0000000  0.0000000 -0.4583458  0.0000000  0.0000000
## [2419]  0.0000000  0.0000000  0.0000000 -0.4583458  0.0000000 -0.4583458
## [2425] -0.4583458 -0.4583458 -0.4583458  0.0000000 -0.4583458 -0.4583458
## [2431] -0.4583458  0.0000000  0.0000000  0.0000000 -0.4583458 -0.4583458
## [2437] -0.4583458  0.0000000  0.0000000 -0.4583458 -0.4583458 -0.4583458
## [2443]  0.0000000 -0.4583458 -0.4583458 -0.4583458 -0.4583458 -0.4583458
## [2449] -0.4583458  0.0000000  0.0000000  0.0000000  0.0000000 -0.4583458
## [2455]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [2461]  0.0000000  0.0000000 -0.4583458 -0.4583458  0.0000000  0.0000000
## [2467] -0.4583458 -0.4583458  0.0000000 -0.4583458  0.0000000 -0.4583458
## [2473]  0.0000000 -0.4583458  0.0000000  0.0000000 -0.4583458 -0.4583458
## [2479]  0.0000000 -0.4583458 -0.4583458  0.0000000 -0.4583458  0.0000000
## [2485]  0.0000000 -0.4583458 -0.4583458 -0.4583458 -0.4583458 -0.4583458
## [2491] -0.4583458 -0.4583458 -0.4583458 -0.4583458 -0.4583458  0.0000000
```

```
## [2497]  0.0000000  0.0000000 -0.4583458  0.0000000 -0.4583458 -0.4583458
## [2503]  0.0000000 -0.4583458  0.0000000  0.0000000 -0.4583458  0.0000000
## [2509]  0.0000000 -0.4583458 -0.4583458  0.0000000  0.0000000  0.0000000
## [2515] -0.4583458 -0.4583458  0.0000000 -0.4583458  0.0000000  0.0000000
## [2521] -0.4583458  0.0000000 -0.4583458 -0.4583458  0.0000000 -0.4583458
## [2527] -0.4583458 -0.4583458 -0.4583458  0.0000000  0.0000000 -0.4583458
## [2533] -0.4583458 -0.4583458  0.0000000  0.0000000 -0.4583458  0.0000000
## [2539] -0.4583458  0.0000000  0.0000000 -0.4583458 -0.4583458  0.0000000
## [2545] -0.4583458  0.0000000  0.0000000 -0.4583458  0.0000000 -0.4583458
## [2551]  0.0000000 -0.4583458 -0.4583458 -0.4583458 -0.4583458 -0.4583458
## [2557]  0.0000000  0.0000000  0.0000000  0.0000000 -0.4583458  0.0000000
## [2563] -0.4583458 -0.4583458 -0.4583458  0.0000000  0.0000000 -0.4583458
## [2569]  0.0000000 -0.4583458  0.0000000  0.0000000 -0.4583458 -0.4583458
## [2575] -0.4583458 -0.4583458  0.0000000 -0.4583458 -0.4583458  0.0000000
## [2581]  0.0000000  0.0000000 -0.4583458 -0.4583458 -0.4583458  0.0000000
## [2587] -0.4583458  0.0000000  0.0000000 -0.4583458  0.0000000  0.0000000
## [2593] -0.4583458  0.0000000 -0.4583458 -0.4583458 -0.4583458  0.0000000
## [2599]  0.0000000 -0.4583458  0.0000000 -0.4583458  0.0000000 -0.4583458
## [2605] -0.4583458 -0.4583458  0.0000000  0.0000000 -0.4583458  0.0000000
## [2611]  0.0000000 -0.4583458 -0.4583458 -0.4583458 -0.4583458 -0.4583458
## [2617]  0.0000000 -0.4583458  0.0000000 -0.4583458  0.0000000 -0.4583458
## [2623]  0.0000000 -0.4583458 -0.4583458 -0.4583458 -0.4583458  0.0000000
## [2629] -0.4583458 -0.4583458  0.0000000  0.0000000  0.0000000  0.0000000
## [2635]  0.0000000  0.0000000 -0.4583458 -0.4583458  0.0000000 -0.4583458
## [2641] -0.4583458  0.0000000  0.0000000 -0.4583458 -0.4583458  0.0000000
## [2647]  0.0000000  0.0000000 -0.4583458  0.0000000 -0.4583458  0.0000000
## [2653] -0.4583458  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [2659] -0.4583458  0.0000000 -0.4583458 -0.4583458 -0.4583458 -0.4583458
## [2665]  0.0000000 -0.4583458 -0.4583458  0.0000000 -0.4583458 -0.4583458
## [2671] -0.4583458  0.0000000 -0.4583458 -0.4583458 -0.4583458  0.0000000
## [2677] -0.4583458  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [2683] -0.4583458  0.0000000 -0.4583458  0.0000000 -0.4583458  0.0000000
## [2689] -0.4583458  0.0000000  0.0000000 -0.4583458 -0.4583458 -0.4583458
## [2695] -0.4583458 -0.4583458  0.0000000  0.0000000  0.0000000  0.0000000
## [2701] -0.4583458 -0.4583458 -0.4583458 -0.4583458 -0.4583458  0.0000000
## [2707] -0.4583458  0.0000000  0.0000000  0.0000000 -0.4583458  0.0000000
## [2713] -0.4583458  0.0000000  0.0000000  0.0000000 -0.4583458 -0.4583458
## [2719]  0.0000000  0.0000000  0.0000000 -0.4583458  0.0000000  0.0000000
## [2725] -0.4583458  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [2731] -0.4583458  0.0000000 -0.4583458 -0.4583458 -0.4583458  0.0000000
## [2737]  0.0000000  0.0000000 -0.4583458 -0.4583458 -0.4583458  0.0000000
## [2743]  0.0000000 -0.4583458 -0.4583458  0.0000000  0.0000000  0.0000000
## [2749]  0.0000000 -0.4583458  0.0000000  0.0000000  0.0000000 -0.4583458
## [2755] -0.4583458 -0.4583458 -0.4583458  0.0000000  0.0000000  0.0000000
## [2761]  0.0000000 -0.4583458  0.0000000  0.0000000  0.0000000 -0.4583458
## [2767] -0.4583458 -0.4583458 -0.4583458 -0.4583458 -0.4583458  0.0000000
```

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## [2773]  0.0000000  0.0000000  0.0000000 -0.4583458 -0.4583458 -0.4583458
## [2779]  0.0000000 -0.4583458 -0.4583458  0.0000000  0.0000000  0.0000000
## [2785]  0.0000000 -0.4583458 -0.4583458  0.0000000 -0.4583458 -0.4583458
## [2791]  0.0000000  0.0000000 -0.4583458 -0.4583458 -0.4583458  0.0000000
## [2797]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000 -0.4583458
## [2803]  0.0000000 -0.4583458 -0.4583458  0.0000000  0.0000000  0.0000000
## [2809]  0.0000000 -0.4583458  0.0000000 -0.4583458 -0.4583458  0.0000000
## [2815] -0.4583458  0.0000000 -0.4583458  0.0000000  0.0000000  0.0000000
## [2821]  0.0000000  0.0000000  0.0000000 -0.4583458 -0.4583458  0.0000000
## [2827] -0.4583458  0.0000000 -0.4583458 -0.4583458  0.0000000 -0.4583458
## [2833] -0.4583458  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [2839] -0.4583458  0.0000000 -0.4583458 -0.4583458  0.0000000 -0.4583458
## [2845] -0.4583458 -0.4583458 -0.4583458  0.0000000  0.0000000  0.0000000
## [2851]  0.0000000 -0.4583458  0.0000000  0.0000000  0.0000000 -0.4583458
## [2857] -0.4583458  0.0000000 -0.4583458  0.0000000  0.0000000 -0.4583458
## [2863]  0.0000000  0.0000000 -0.4583458 -0.4583458  0.0000000 -0.4583458
## [2869] -0.4583458  0.0000000 -0.4583458 -0.4583458  0.0000000  0.0000000
## [2875]  0.0000000  0.0000000 -0.4583458  0.0000000  0.0000000  0.0000000
## [2881]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [2887]  0.0000000 -0.4583458 -0.4583458 -0.4583458  0.0000000  0.0000000
## [2893]  0.0000000  0.0000000 -0.4583458 -0.4583458 -0.4583458 -0.4583458
## [2899]  0.0000000 -0.4583458  0.0000000 -0.4583458 -0.4583458 -0.4583458
## [2905]  0.0000000 -0.4583458 -0.4583458  0.0000000 -0.4583458  0.0000000
## [2911]  0.0000000 -0.4583458 -0.4583458 -0.4583458 -0.4583458  0.0000000
## [2917] -0.4583458 -0.4583458 -0.4583458  0.0000000  0.0000000 -0.4583458
## [2923]  0.0000000 -0.4583458 -0.4583458  0.0000000 -0.4583458  0.0000000
## [2929]  0.0000000 -0.4583458 -0.4583458  0.0000000  0.0000000  0.0000000
## [2935] -0.4583458  0.0000000  0.0000000 -0.4583458  0.0000000  0.0000000
## [2941]  0.0000000  0.0000000 -0.4583458 -0.4583458 -0.4583458  0.0000000
## [2947]  0.0000000 -0.4583458  0.0000000 -0.4583458 -0.4583458  0.0000000
## [2953]  0.0000000  0.0000000 -0.4583458 -0.4583458  0.0000000  0.0000000
## [2959]  0.0000000 -0.4583458 -0.4583458  0.0000000 -0.4583458  0.0000000
## [2965]  0.0000000  0.0000000 -0.4583458 -0.4583458 -0.4583458 -0.4583458
## [2971]  0.0000000  0.0000000  0.0000000 -0.4583458  0.0000000  0.0000000
## [2977]  0.0000000 -0.4583458  0.0000000 -0.4583458  0.0000000  0.0000000
```

```r
                                        -0.738657689*(rotterdam$size==">50")
```

```
##    [1]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
##    [7]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
##   [13]  0.0000000 -0.7386577  0.0000000  0.0000000  0.0000000  0.0000000
##   [19]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
##   [25]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
##   [31]  0.0000000  0.0000000 -0.7386577  0.0000000  0.0000000  0.0000000
##   [37]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
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##    [43]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
##    [49]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
##    [55]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
##    [61]  0.0000000  0.0000000 -0.7386577  0.0000000  0.0000000  0.0000000
##    [67]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000 -0.7386577
##    [73]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
##    [79]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
##    [85]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
##    [91]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
##    [97]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
##   [103]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
##   [109]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
##   [115]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
##   [121]  0.0000000  0.0000000 -0.7386577  0.0000000  0.0000000  0.0000000
##   [127]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
##   [133]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
##   [139]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
##   [145]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
##   [151]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
##   [157]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
##   [163]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
##   [169]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
##   [175]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
##   [181]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
##   [187]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
##   [193]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
##   [199]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
##   [205]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
##   [211]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
##   [217]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
##   [223]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
##   [229]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
##   [235]  0.0000000 -0.7386577  0.0000000  0.0000000  0.0000000  0.0000000
##   [241]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
##   [247]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
##   [253]  0.0000000  0.0000000  0.0000000  0.0000000 -0.7386577  0.0000000
##   [259]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
##   [265]  0.0000000  0.0000000 -0.7386577  0.0000000  0.0000000  0.0000000
##   [271]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
##   [277]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
##   [283]  0.0000000  0.0000000  0.0000000 -0.7386577  0.0000000 -0.7386577
##   [289]  0.0000000  0.0000000  0.0000000 -0.7386577  0.0000000  0.0000000
##   [295]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
##   [301]  0.0000000  0.0000000 -0.7386577  0.0000000  0.0000000  0.0000000
##   [307]  0.0000000  0.0000000 -0.7386577  0.0000000  0.0000000  0.0000000
##   [313]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
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## [319]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [325]  0.0000000  0.0000000 -0.7386577  0.0000000  0.0000000 -0.7386577
## [331]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [337]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [343]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [349]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [355]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [361]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [367]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [373] -0.7386577  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [379]  0.0000000 -0.7386577  0.0000000  0.0000000  0.0000000  0.0000000
## [385]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [391]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [397]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [403] -0.7386577  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [409]  0.0000000  0.0000000 -0.7386577  0.0000000  0.0000000  0.0000000
## [415]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [421] -0.7386577  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [427]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [433]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [439]  0.0000000  0.0000000  0.0000000  0.0000000 -0.7386577  0.0000000
## [445]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [451]  0.0000000  0.0000000  0.0000000 -0.7386577  0.0000000  0.0000000
## [457]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [463]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [469]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [475]  0.0000000  0.0000000  0.0000000 -0.7386577 -0.7386577  0.0000000
## [481]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [487]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [493]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [499]  0.0000000 -0.7386577  0.0000000  0.0000000  0.0000000  0.0000000
## [505]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [511]  0.0000000  0.0000000  0.0000000 -0.7386577 -0.7386577  0.0000000
## [517]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [523]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [529]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [535]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [541]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [547]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [553]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [559]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [565]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [571]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [577]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000 -0.7386577
## [583]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [589]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
```

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##   [595]  0.0000000   0.0000000   0.0000000   0.0000000   0.0000000   0.0000000
##   [601]  0.0000000   0.0000000   0.0000000   0.0000000   0.0000000   0.0000000
##   [607]  0.0000000   0.0000000   0.0000000   0.0000000   0.0000000   0.0000000
##   [613]  0.0000000   0.0000000   0.0000000   0.0000000   0.0000000   0.0000000
##   [619]  0.0000000   0.0000000   0.0000000   0.0000000   0.0000000   0.0000000
##   [625]  0.0000000   0.0000000   0.0000000   0.0000000  -0.7386577   0.0000000
##   [631]  0.0000000   0.0000000   0.0000000   0.0000000   0.0000000   0.0000000
##   [637]  0.0000000   0.0000000   0.0000000   0.0000000  -0.7386577   0.0000000
##   [643]  0.0000000   0.0000000   0.0000000   0.0000000  -0.7386577   0.0000000
##   [649]  0.0000000   0.0000000   0.0000000   0.0000000   0.0000000   0.0000000
##   [655]  0.0000000   0.0000000   0.0000000   0.0000000   0.0000000   0.0000000
##   [661]  0.0000000   0.0000000   0.0000000   0.0000000  -0.7386577   0.0000000
##   [667]  0.0000000   0.0000000   0.0000000   0.0000000   0.0000000   0.0000000
##   [673] -0.7386577   0.0000000   0.0000000   0.0000000   0.0000000   0.0000000
##   [679]  0.0000000   0.0000000   0.0000000   0.0000000  -0.7386577   0.0000000
##   [685]  0.0000000   0.0000000   0.0000000   0.0000000   0.0000000   0.0000000
##   [691]  0.0000000   0.0000000   0.0000000   0.0000000   0.0000000   0.0000000
##   [697]  0.0000000   0.0000000   0.0000000   0.0000000   0.0000000   0.0000000
##   [703]  0.0000000   0.0000000   0.0000000   0.0000000   0.0000000   0.0000000
##   [709]  0.0000000   0.0000000   0.0000000   0.0000000   0.0000000   0.0000000
##   [715]  0.0000000   0.0000000   0.0000000   0.0000000   0.0000000   0.0000000
##   [721] -0.7386577   0.0000000  -0.7386577   0.0000000   0.0000000   0.0000000
##   [727]  0.0000000   0.0000000   0.0000000   0.0000000   0.0000000   0.0000000
##   [733]  0.0000000  -0.7386577   0.0000000   0.0000000   0.0000000   0.0000000
##   [739]  0.0000000   0.0000000   0.0000000   0.0000000   0.0000000   0.0000000
##   [745]  0.0000000   0.0000000   0.0000000   0.0000000   0.0000000   0.0000000
##   [751]  0.0000000   0.0000000   0.0000000   0.0000000   0.0000000  -0.7386577
##   [757]  0.0000000   0.0000000   0.0000000   0.0000000   0.0000000   0.0000000
##   [763] -0.7386577   0.0000000   0.0000000   0.0000000   0.0000000   0.0000000
##   [769]  0.0000000   0.0000000   0.0000000   0.0000000   0.0000000   0.0000000
##   [775]  0.0000000   0.0000000   0.0000000   0.0000000   0.0000000   0.0000000
##   [781]  0.0000000   0.0000000   0.0000000   0.0000000   0.0000000   0.0000000
##   [787]  0.0000000   0.0000000   0.0000000   0.0000000   0.0000000   0.0000000
##   [793]  0.0000000  -0.7386577   0.0000000  -0.7386577   0.0000000   0.0000000
##   [799]  0.0000000   0.0000000   0.0000000   0.0000000   0.0000000   0.0000000
##   [805]  0.0000000   0.0000000   0.0000000   0.0000000   0.0000000   0.0000000
##   [811]  0.0000000   0.0000000   0.0000000  -0.7386577   0.0000000   0.0000000
##   [817]  0.0000000   0.0000000  -0.7386577   0.0000000   0.0000000  -0.7386577
##   [823]  0.0000000   0.0000000   0.0000000   0.0000000   0.0000000   0.0000000
##   [829]  0.0000000   0.0000000   0.0000000   0.0000000   0.0000000   0.0000000
##   [835]  0.0000000   0.0000000   0.0000000  -0.7386577   0.0000000   0.0000000
##   [841]  0.0000000  -0.7386577   0.0000000   0.0000000   0.0000000   0.0000000
##   [847]  0.0000000   0.0000000   0.0000000   0.0000000   0.0000000  -0.7386577
##   [853]  0.0000000   0.0000000   0.0000000   0.0000000   0.0000000   0.0000000
##   [859]  0.0000000   0.0000000   0.0000000   0.0000000   0.0000000   0.0000000
##   [865]  0.0000000   0.0000000   0.0000000   0.0000000   0.0000000  -0.7386577
```

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##  [871]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
##  [877]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
##  [883]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
##  [889]  0.0000000  0.0000000 -0.7386577  0.0000000  0.0000000  0.0000000
##  [895]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
##  [901]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
##  [907]  0.0000000  0.0000000  0.0000000  0.0000000 -0.7386577  0.0000000
##  [913]  0.0000000 -0.7386577  0.0000000  0.0000000  0.0000000  0.0000000
##  [919]  0.0000000  0.0000000 -0.7386577  0.0000000  0.0000000  0.0000000
##  [925]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
##  [931] -0.7386577  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
##  [937]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
##  [943]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
##  [949]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
##  [955]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
##  [961]  0.0000000  0.0000000  0.0000000  0.0000000 -0.7386577  0.0000000
##  [967]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
##  [973]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
##  [979]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
##  [985]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
##  [991]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
##  [997]  0.0000000 -0.7386577  0.0000000  0.0000000  0.0000000  0.0000000
## [1003]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [1009]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [1015]  0.0000000  0.0000000  0.0000000 -0.7386577  0.0000000  0.0000000
## [1021]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [1027]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [1033]  0.0000000 -0.7386577 -0.7386577  0.0000000  0.0000000  0.0000000
## [1039]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [1045]  0.0000000 -0.7386577  0.0000000  0.0000000  0.0000000  0.0000000
## [1051]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [1057]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [1063] -0.7386577  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [1069]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [1075] -0.7386577  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [1081]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000 -0.7386577
## [1087]  0.0000000  0.0000000  0.0000000  0.0000000 -0.7386577  0.0000000
## [1093]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [1099]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [1105]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [1111]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [1117]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [1123]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [1129]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [1135]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [1141]  0.0000000  0.0000000  0.0000000  0.0000000 -0.7386577  0.0000000
```

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## [1147]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [1153]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [1159]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [1165]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [1171]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [1177]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [1183] -0.7386577  0.0000000  0.0000000 -0.7386577  0.0000000  0.0000000
## [1189]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [1195]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [1201]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [1207]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [1213]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [1219] -0.7386577  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [1225]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [1231] -0.7386577  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [1237]  0.0000000  0.0000000  0.0000000 -0.7386577  0.0000000  0.0000000
## [1243]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [1249]  0.0000000 -0.7386577  0.0000000  0.0000000  0.0000000  0.0000000
## [1255]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [1261]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [1267]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [1273]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [1279] -0.7386577  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [1285]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [1291]  0.0000000  0.0000000  0.0000000  0.0000000 -0.7386577  0.0000000
## [1297]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [1303]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [1309]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [1315] -0.7386577  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [1321]  0.0000000  0.0000000  0.0000000 -0.7386577  0.0000000  0.0000000
## [1327]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [1333]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [1339]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [1345]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000 -0.7386577
## [1351]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [1357]  0.0000000  0.0000000  0.0000000 -0.7386577  0.0000000  0.0000000
## [1363]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [1369]  0.0000000  0.0000000  0.0000000 -0.7386577 -0.7386577  0.0000000
## [1375]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [1381]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [1387]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [1393]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [1399]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [1405]  0.0000000  0.0000000 -0.7386577  0.0000000  0.0000000 -0.7386577
## [1411]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [1417]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
```

```
## [1423]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [1429]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000 -0.7386577
## [1435]  0.0000000  0.0000000  0.0000000  0.0000000 -0.7386577  0.0000000
## [1441]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [1447]  0.0000000 -0.7386577  0.0000000  0.0000000  0.0000000  0.0000000
## [1453] -0.7386577  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [1459]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [1465]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000 -0.7386577
## [1471]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [1477]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [1483]  0.0000000  0.0000000 -0.7386577  0.0000000  0.0000000 -0.7386577
## [1489]  0.0000000  0.0000000 -0.7386577 -0.7386577  0.0000000  0.0000000
## [1495]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [1501]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [1507]  0.0000000 -0.7386577  0.0000000  0.0000000  0.0000000  0.0000000
## [1513]  0.0000000 -0.7386577  0.0000000  0.0000000  0.0000000  0.0000000
## [1519]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [1525]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [1531] -0.7386577  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [1537]  0.0000000  0.0000000  0.0000000 -0.7386577  0.0000000 -0.7386577
## [1543]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [1549]  0.0000000 -0.7386577  0.0000000  0.0000000  0.0000000  0.0000000
## [1555]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [1561]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [1567]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [1573] -0.7386577  0.0000000 -0.7386577  0.0000000 -0.7386577 -0.7386577
## [1579]  0.0000000  0.0000000 -0.7386577  0.0000000  0.0000000  0.0000000
## [1585]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [1591]  0.0000000 -0.7386577  0.0000000  0.0000000  0.0000000  0.0000000
## [1597]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [1603]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [1609]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [1615]  0.0000000  0.0000000 -0.7386577  0.0000000  0.0000000  0.0000000
## [1621] -0.7386577 -0.7386577  0.0000000 -0.7386577  0.0000000  0.0000000
## [1627]  0.0000000 -0.7386577  0.0000000  0.0000000  0.0000000 -0.7386577
## [1633]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [1639]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [1645]  0.0000000 -0.7386577  0.0000000 -0.7386577  0.0000000  0.0000000
## [1651]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [1657]  0.0000000 -0.7386577  0.0000000  0.0000000  0.0000000  0.0000000
## [1663]  0.0000000  0.0000000  0.0000000 -0.7386577  0.0000000  0.0000000
## [1669]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [1675]  0.0000000  0.0000000 -0.7386577  0.0000000  0.0000000  0.0000000
## [1681]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [1687]  0.0000000  0.0000000  0.0000000  0.0000000 -0.7386577  0.0000000
## [1693]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
```

```
## [1699]  0.0000000   0.0000000   0.0000000   0.0000000   0.0000000   0.0000000
## [1705]  0.0000000  -0.7386577   0.0000000   0.0000000   0.0000000   0.0000000
## [1711]  0.0000000   0.0000000   0.0000000   0.0000000  -0.7386577   0.0000000
## [1717]  0.0000000  -0.7386577   0.0000000   0.0000000   0.0000000   0.0000000
## [1723]  0.0000000  -0.7386577  -0.7386577   0.0000000   0.0000000   0.0000000
## [1729]  0.0000000   0.0000000   0.0000000   0.0000000   0.0000000   0.0000000
## [1735]  0.0000000   0.0000000   0.0000000  -0.7386577   0.0000000   0.0000000
## [1741]  0.0000000  -0.7386577   0.0000000   0.0000000  -0.7386577  -0.7386577
## [1747]  0.0000000   0.0000000   0.0000000   0.0000000   0.0000000   0.0000000
## [1753]  0.0000000   0.0000000   0.0000000   0.0000000  -0.7386577  -0.7386577
## [1759]  0.0000000   0.0000000   0.0000000   0.0000000   0.0000000  -0.7386577
## [1765]  0.0000000  -0.7386577   0.0000000  -0.7386577  -0.7386577   0.0000000
## [1771]  0.0000000   0.0000000   0.0000000   0.0000000   0.0000000   0.0000000
## [1777]  0.0000000   0.0000000   0.0000000   0.0000000   0.0000000   0.0000000
## [1783]  0.0000000   0.0000000   0.0000000   0.0000000   0.0000000   0.0000000
## [1789]  0.0000000   0.0000000   0.0000000   0.0000000   0.0000000   0.0000000
## [1795]  0.0000000   0.0000000  -0.7386577  -0.7386577   0.0000000   0.0000000
## [1801]  0.0000000   0.0000000   0.0000000   0.0000000   0.0000000   0.0000000
## [1807]  0.0000000   0.0000000   0.0000000   0.0000000  -0.7386577   0.0000000
## [1813]  0.0000000   0.0000000  -0.7386577   0.0000000   0.0000000   0.0000000
## [1819]  0.0000000   0.0000000   0.0000000   0.0000000  -0.7386577   0.0000000
## [1825]  0.0000000  -0.7386577   0.0000000   0.0000000   0.0000000   0.0000000
## [1831]  0.0000000   0.0000000  -0.7386577  -0.7386577   0.0000000   0.0000000
## [1837]  0.0000000   0.0000000   0.0000000   0.0000000   0.0000000   0.0000000
## [1843]  0.0000000  -0.7386577   0.0000000   0.0000000  -0.7386577   0.0000000
## [1849] -0.7386577   0.0000000   0.0000000   0.0000000  -0.7386577   0.0000000
## [1855]  0.0000000   0.0000000   0.0000000   0.0000000  -0.7386577   0.0000000
## [1861]  0.0000000   0.0000000   0.0000000   0.0000000  -0.7386577   0.0000000
## [1867]  0.0000000   0.0000000   0.0000000   0.0000000   0.0000000   0.0000000
## [1873]  0.0000000   0.0000000   0.0000000   0.0000000  -0.7386577   0.0000000
## [1879]  0.0000000   0.0000000   0.0000000   0.0000000   0.0000000   0.0000000
## [1885]  0.0000000  -0.7386577   0.0000000   0.0000000  -0.7386577  -0.7386577
## [1891]  0.0000000  -0.7386577   0.0000000   0.0000000   0.0000000   0.0000000
## [1897] -0.7386577  -0.7386577   0.0000000   0.0000000  -0.7386577   0.0000000
## [1903]  0.0000000   0.0000000   0.0000000   0.0000000   0.0000000   0.0000000
## [1909]  0.0000000   0.0000000   0.0000000   0.0000000   0.0000000   0.0000000
## [1915] -0.7386577   0.0000000  -0.7386577   0.0000000   0.0000000   0.0000000
## [1921]  0.0000000   0.0000000   0.0000000   0.0000000   0.0000000   0.0000000
## [1927]  0.0000000   0.0000000   0.0000000   0.0000000  -0.7386577   0.0000000
## [1933]  0.0000000   0.0000000  -0.7386577   0.0000000   0.0000000   0.0000000
## [1939]  0.0000000   0.0000000  -0.7386577   0.0000000   0.0000000   0.0000000
## [1945]  0.0000000  -0.7386577  -0.7386577   0.0000000   0.0000000  -0.7386577
## [1951]  0.0000000   0.0000000   0.0000000   0.0000000   0.0000000   0.0000000
## [1957]  0.0000000   0.0000000   0.0000000   0.0000000   0.0000000   0.0000000
## [1963]  0.0000000  -0.7386577   0.0000000   0.0000000   0.0000000   0.0000000
## [1969]  0.0000000   0.0000000   0.0000000   0.0000000   0.0000000   0.0000000
```

```
## [1975]  0.0000000  0.0000000 -0.7386577  0.0000000 -0.7386577  0.0000000
## [1981] -0.7386577  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [1987]  0.0000000  0.0000000  0.0000000  0.0000000 -0.7386577  0.0000000
## [1993] -0.7386577  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [1999]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [2005]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000 -0.7386577
## [2011]  0.0000000  0.0000000  0.0000000  0.0000000 -0.7386577  0.0000000
## [2017]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [2023]  0.0000000  0.0000000  0.0000000  0.0000000 -0.7386577  0.0000000
## [2029]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [2035]  0.0000000  0.0000000 -0.7386577  0.0000000  0.0000000  0.0000000
## [2041]  0.0000000  0.0000000  0.0000000 -0.7386577 -0.7386577  0.0000000
## [2047] -0.7386577  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [2053]  0.0000000  0.0000000  0.0000000 -0.7386577  0.0000000  0.0000000
## [2059]  0.0000000 -0.7386577  0.0000000 -0.7386577  0.0000000  0.0000000
## [2065]  0.0000000  0.0000000  0.0000000  0.0000000 -0.7386577  0.0000000
## [2071]  0.0000000  0.0000000  0.0000000 -0.7386577  0.0000000  0.0000000
## [2077]  0.0000000 -0.7386577  0.0000000 -0.7386577  0.0000000  0.0000000
## [2083]  0.0000000  0.0000000  0.0000000 -0.7386577  0.0000000  0.0000000
## [2089]  0.0000000  0.0000000  0.0000000  0.0000000 -0.7386577  0.0000000
## [2095]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [2101]  0.0000000  0.0000000  0.0000000  0.0000000 -0.7386577  0.0000000
## [2107] -0.7386577 -0.7386577 -0.7386577 -0.7386577  0.0000000  0.0000000
## [2113] -0.7386577  0.0000000 -0.7386577  0.0000000  0.0000000  0.0000000
## [2119]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [2125]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [2131]  0.0000000  0.0000000 -0.7386577  0.0000000  0.0000000  0.0000000
## [2137]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [2143] -0.7386577  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [2149]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [2155]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000 -0.7386577
## [2161]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [2167]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [2173]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [2179]  0.0000000  0.0000000  0.0000000  0.0000000 -0.7386577  0.0000000
## [2185]  0.0000000  0.0000000  0.0000000 -0.7386577  0.0000000  0.0000000
## [2191]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [2197]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [2203]  0.0000000 -0.7386577  0.0000000  0.0000000  0.0000000  0.0000000
## [2209]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [2215]  0.0000000  0.0000000  0.0000000  0.0000000 -0.7386577  0.0000000
## [2221]  0.0000000  0.0000000 -0.7386577 -0.7386577  0.0000000 -0.7386577
## [2227] -0.7386577  0.0000000 -0.7386577  0.0000000  0.0000000  0.0000000
## [2233]  0.0000000 -0.7386577  0.0000000  0.0000000  0.0000000 -0.7386577
## [2239]  0.0000000 -0.7386577  0.0000000  0.0000000  0.0000000  0.0000000
## [2245]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
```

```
## [2251]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [2257] -0.7386577  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [2263]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000 -0.7386577
## [2269]  0.0000000  0.0000000 -0.7386577  0.0000000  0.0000000  0.0000000
## [2275] -0.7386577  0.0000000 -0.7386577  0.0000000  0.0000000  0.0000000
## [2281]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [2287]  0.0000000  0.0000000  0.0000000  0.0000000 -0.7386577  0.0000000
## [2293]  0.0000000 -0.7386577  0.0000000  0.0000000  0.0000000  0.0000000
## [2299] -0.7386577  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [2305]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [2311]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [2317]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [2323]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [2329]  0.0000000  0.0000000  0.0000000  0.0000000 -0.7386577  0.0000000
## [2335]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [2341] -0.7386577  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [2347]  0.0000000  0.0000000  0.0000000 -0.7386577 -0.7386577  0.0000000
## [2353] -0.7386577  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [2359]  0.0000000  0.0000000 -0.7386577 -0.7386577  0.0000000  0.0000000
## [2365] -0.7386577  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [2371]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [2377]  0.0000000  0.0000000 -0.7386577  0.0000000  0.0000000  0.0000000
## [2383]  0.0000000 -0.7386577  0.0000000  0.0000000  0.0000000  0.0000000
## [2389]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000 -0.7386577
## [2395]  0.0000000  0.0000000  0.0000000  0.0000000 -0.7386577  0.0000000
## [2401]  0.0000000 -0.7386577  0.0000000  0.0000000  0.0000000  0.0000000
## [2407]  0.0000000  0.0000000 -0.7386577  0.0000000  0.0000000  0.0000000
## [2413]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [2419]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [2425]  0.0000000  0.0000000  0.0000000 -0.7386577  0.0000000  0.0000000
## [2431]  0.0000000 -0.7386577 -0.7386577  0.0000000  0.0000000  0.0000000
## [2437]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [2443]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [2449]  0.0000000 -0.7386577 -0.7386577  0.0000000  0.0000000  0.0000000
## [2455] -0.7386577  0.0000000 -0.7386577  0.0000000  0.0000000  0.0000000
## [2461] -0.7386577 -0.7386577  0.0000000  0.0000000  0.0000000  0.0000000
## [2467]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [2473]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [2479]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000 -0.7386577
## [2485] -0.7386577  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [2491]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [2497] -0.7386577  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [2503] -0.7386577  0.0000000  0.0000000 -0.7386577  0.0000000  0.0000000
## [2509]  0.0000000  0.0000000  0.0000000  0.0000000 -0.7386577  0.0000000
## [2515]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [2521]  0.0000000 -0.7386577  0.0000000  0.0000000  0.0000000  0.0000000
```

```
## [2527]  0.0000000  0.0000000  0.0000000  0.0000000 -0.7386577  0.0000000
## [2533]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [2539]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000 -0.7386577
## [2545]  0.0000000 -0.7386577 -0.7386577  0.0000000  0.0000000  0.0000000
## [2551] -0.7386577  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [2557] -0.7386577 -0.7386577  0.0000000  0.0000000  0.0000000 -0.7386577
## [2563]  0.0000000  0.0000000  0.0000000 -0.7386577  0.0000000  0.0000000
## [2569] -0.7386577  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [2575]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [2581]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [2587]  0.0000000  0.0000000 -0.7386577  0.0000000  0.0000000  0.0000000
## [2593]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [2599]  0.0000000  0.0000000  0.0000000  0.0000000 -0.7386577  0.0000000
## [2605]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000 -0.7386577
## [2611]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [2617]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [2623]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [2629]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [2635]  0.0000000 -0.7386577  0.0000000  0.0000000  0.0000000  0.0000000
## [2641]  0.0000000 -0.7386577 -0.7386577  0.0000000  0.0000000  0.0000000
## [2647]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [2653]  0.0000000  0.0000000 -0.7386577  0.0000000 -0.7386577 -0.7386577
## [2659]  0.0000000 -0.7386577  0.0000000  0.0000000  0.0000000  0.0000000
## [2665] -0.7386577  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [2671]  0.0000000 -0.7386577  0.0000000  0.0000000  0.0000000  0.0000000
## [2677]  0.0000000  0.0000000 -0.7386577  0.0000000  0.0000000 -0.7386577
## [2683]  0.0000000 -0.7386577  0.0000000  0.0000000  0.0000000  0.0000000
## [2689]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [2695]  0.0000000  0.0000000  0.0000000  0.0000000 -0.7386577  0.0000000
## [2701]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000 -0.7386577
## [2707]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [2713]  0.0000000 -0.7386577  0.0000000  0.0000000  0.0000000  0.0000000
## [2719]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [2725]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [2731]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000 -0.7386577
## [2737]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [2743]  0.0000000  0.0000000  0.0000000 -0.7386577  0.0000000  0.0000000
## [2749]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [2755]  0.0000000  0.0000000  0.0000000 -0.7386577  0.0000000 -0.7386577
## [2761] -0.7386577  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [2767]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [2773]  0.0000000  0.0000000 -0.7386577  0.0000000  0.0000000  0.0000000
## [2779]  0.0000000  0.0000000  0.0000000  0.0000000 -0.7386577  0.0000000
## [2785]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [2791] -0.7386577 -0.7386577  0.0000000  0.0000000  0.0000000  0.0000000
## [2797]  0.0000000  0.0000000 -0.7386577  0.0000000  0.0000000  0.0000000
```

```
## [2803]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [2809]  0.0000000  0.0000000 -0.7386577  0.0000000  0.0000000  0.0000000
## [2815]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000 -0.7386577
## [2821]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [2827]  0.0000000  0.0000000  0.0000000  0.0000000 -0.7386577  0.0000000
## [2833]  0.0000000 -0.7386577  0.0000000  0.0000000 -0.7386577  0.0000000
## [2839]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [2845]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [2851]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [2857]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [2863]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [2869]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [2875]  0.0000000  0.0000000  0.0000000 -0.7386577  0.0000000  0.0000000
## [2881]  0.0000000 -0.7386577 -0.7386577 -0.7386577  0.0000000  0.0000000
## [2887] -0.7386577  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [2893]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [2899]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [2905] -0.7386577  0.0000000  0.0000000 -0.7386577  0.0000000  0.0000000
## [2911]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000 -0.7386577
## [2917]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [2923]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [2929] -0.7386577  0.0000000  0.0000000 -0.7386577 -0.7386577 -0.7386577
## [2935]  0.0000000 -0.7386577  0.0000000  0.0000000  0.0000000  0.0000000
## [2941] -0.7386577  0.0000000  0.0000000  0.0000000  0.0000000 -0.7386577
## [2947]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [2953]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [2959]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000 -0.7386577
## [2965] -0.7386577  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [2971] -0.7386577  0.0000000 -0.7386577  0.0000000  0.0000000  0.0000000
## [2977] -0.7386577  0.0000000 -0.7386577  0.0000000  0.0000000  0.0000000
```

```
                                          -0.107708963*rotterdam$nodes
```

```
##    [1]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
##    [7]  0.0000000  0.0000000  0.0000000 -0.5385448  0.0000000 -0.1077090
##   [13]  0.0000000 -0.9693807  0.0000000  0.0000000 -0.4308359 -0.6462538
##   [19] -0.1077090  0.0000000 -0.1077090  0.0000000  0.0000000  0.0000000
##   [25]  0.0000000 -0.2154179  0.0000000  0.0000000 -0.1077090  0.0000000
##   [31]  0.0000000 -0.1077090  0.0000000  0.0000000 -0.2154179 -0.1077090
##   [37]  0.0000000  0.0000000  0.0000000 -0.4308359 -0.1077090  0.0000000
##   [43]  0.0000000  0.0000000 -0.5385448  0.0000000  0.0000000 -0.2154179
##   [49]  0.0000000  0.0000000  0.0000000 -0.4308359  0.0000000 -0.1077090
##   [55]  0.0000000 -0.1077090  0.0000000 -0.8616717  0.0000000  0.0000000
##   [61]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
##   [67] -0.4308359  0.0000000  0.0000000 -0.1077090 -0.2154179 -0.7539627
```

```
##    [73] -0.5385448  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
##    [79] -0.2154179  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
##    [85] -0.1077090  0.0000000 -0.4308359  0.0000000  0.0000000  0.0000000
##    [91]  0.0000000 -0.1077090  0.0000000 -0.2154179  0.0000000 -0.1077090
##    [97]  0.0000000 -0.8616717 -0.4308359 -0.2154179 -0.1077090 -0.1077090
##   [103]  0.0000000 -0.1077090 -1.1847986  0.0000000 -0.1077090  0.0000000
##   [109] -0.3231269 -1.5079255  0.0000000  0.0000000 -0.2154179  0.0000000
##   [115]  0.0000000  0.0000000 -0.4308359 -0.1077090  0.0000000 -0.3231269
##   [121]  0.0000000  0.0000000 -0.1077090  0.0000000  0.0000000  0.0000000
##   [127]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
##   [133]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
##   [139]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000 -0.5385448
##   [145] -0.1077090  0.0000000 -0.1077090 -0.1077090 -0.1077090  0.0000000
##   [151]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
##   [157] -0.1077090  0.0000000  0.0000000  0.0000000 -0.1077090  0.0000000
##   [163]  0.0000000 -0.4308359  0.0000000  0.0000000 -0.7539627  0.0000000
##   [169]  0.0000000  0.0000000 -0.4308359 -0.2154179  0.0000000 -0.1077090
##   [175]  0.0000000  0.0000000 -0.7539627  0.0000000  0.0000000 -0.2154179
##   [181]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
##   [187]  0.0000000  0.0000000  0.0000000  0.0000000 -0.1077090 -0.1077090
##   [193] -0.2154179  0.0000000 -0.1077090  0.0000000 -0.1077090 -0.2154179
##   [199]  0.0000000  0.0000000 -0.4308359 -0.1077090  0.0000000  0.0000000
##   [205]  0.0000000 -0.4308359  0.0000000  0.0000000  0.0000000 -0.1077090
##   [211] -0.6462538  0.0000000 -0.1077090  0.0000000  0.0000000  0.0000000
##   [217] -0.4308359  0.0000000 -0.6462538  0.0000000  0.0000000 -0.5385448
##   [223]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
##   [229]  0.0000000  0.0000000  0.0000000  0.0000000 -0.1077090  0.0000000
##   [235]  0.0000000 -1.6156344  0.0000000  0.0000000 -0.4308359 -0.2154179
##   [241] -0.2154179  0.0000000  0.0000000  0.0000000 -0.1077090  0.0000000
##   [247] -0.1077090  0.0000000  0.0000000 -0.3231269  0.0000000 -0.1077090
##   [253]  0.0000000  0.0000000 -0.2154179 -0.3231269 -0.1077090  0.0000000
##   [259] -0.8616717  0.0000000  0.0000000  0.0000000  0.0000000 -0.3231269
##   [265]  0.0000000  0.0000000 -0.4308359  0.0000000 -0.2154179  0.0000000
##   [271]  0.0000000 -0.1077090  0.0000000  0.0000000  0.0000000  0.0000000
##   [277]  0.0000000  0.0000000  0.0000000  0.0000000 -0.1077090  0.0000000
##   [283]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000 -0.9693807
##   [289] -0.2154179  0.0000000  0.0000000 -0.8616717  0.0000000  0.0000000
##   [295] -0.2154179  0.0000000  0.0000000 -0.4308359 -0.2154179 -0.1077090
##   [301]  0.0000000  0.0000000 -0.1077090 -0.1077090  0.0000000 -0.1077090
##   [307] -1.5079255  0.0000000  0.0000000 -0.1077090  0.0000000 -0.1077090
##   [313] -0.1077090  0.0000000  0.0000000 -0.1077090  0.0000000 -0.6462538
##   [319]  0.0000000 -0.4308359  0.0000000 -1.5079255  0.0000000  0.0000000
##   [325]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000 -1.4002165
##   [331]  0.0000000  0.0000000 -0.1077090 -0.3231269 -0.3231269 -0.4308359
##   [337]  0.0000000 -0.1077090  0.0000000 -1.7233434  0.0000000  0.0000000
##   [343]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
```

```
##   [349]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000 -0.9693807
##   [355]  0.0000000 -0.5385448  0.0000000 -0.1077090  0.0000000 -0.1077090
##   [361]  0.0000000 -0.6462538  0.0000000  0.0000000  0.0000000 -0.1077090
##   [367]  0.0000000  0.0000000  0.0000000 -0.7539627  0.0000000 -0.1077090
##   [373] -0.1077090  0.0000000 -0.1077090  0.0000000  0.0000000  0.0000000
##   [379]  0.0000000 -0.6462538  0.0000000  0.0000000  0.0000000  0.0000000
##   [385] -0.2154179 -0.4308359  0.0000000 -0.5385448 -0.4308359 -0.2154179
##   [391]  0.0000000  0.0000000 -0.1077090  0.0000000 -0.1077090 -0.1077090
##   [397]  0.0000000 -0.1077090 -2.2618882 -0.2154179  0.0000000  0.0000000
##   [403] -0.1077090 -0.3231269  0.0000000 -0.2154179 -0.1077090  0.0000000
##   [409]  0.0000000  0.0000000  0.0000000 -0.3231269  0.0000000  0.0000000
##   [415]  0.0000000  0.0000000 -0.1077090  0.0000000  0.0000000  0.0000000
##   [421] -0.2154179 -1.0770896  0.0000000  0.0000000  0.0000000 -0.2154179
##   [427] -0.1077090  0.0000000  0.0000000  0.0000000 -0.1077090 -0.6462538
##   [433]  0.0000000  0.0000000 -1.1847986 -0.3231269  0.0000000  0.0000000
##   [439] -0.1077090  0.0000000  0.0000000  0.0000000 -1.2925076 -0.6462538
##   [445]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000 -0.4308359
##   [451]  0.0000000  0.0000000 -0.1077090 -0.6462538 -0.2154179  0.0000000
##   [457] -0.1077090  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
##   [463]  0.0000000 -0.5385448 -0.5385448 -1.4002165 -0.3231269  0.0000000
##   [469] -1.4002165 -0.7539627  0.0000000  0.0000000  0.0000000  0.0000000
##   [475] -0.4308359  0.0000000  0.0000000 -0.6462538  0.0000000  0.0000000
##   [481]  0.0000000  0.0000000  0.0000000  0.0000000 -0.1077090  0.0000000
##   [487]  0.0000000  0.0000000 -0.1077090  0.0000000  0.0000000 -0.1077090
##   [493] -0.1077090  0.0000000  0.0000000  0.0000000  0.0000000 -0.1077090
##   [499]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
##   [505]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000 -0.2154179
##   [511]  0.0000000  0.0000000  0.0000000 -0.1077090 -0.3231269  0.0000000
##   [517]  0.0000000  0.0000000  0.0000000 -0.1077090 -0.1077090  0.0000000
##   [523]  0.0000000 -0.1077090  0.0000000  0.0000000  0.0000000 -0.2154179
##   [529]  0.0000000  0.0000000  0.0000000  0.0000000 -0.2154179  0.0000000
##   [535]  0.0000000 -0.5385448 -0.6462538 -0.1077090  0.0000000 -0.1077090
##   [541]  0.0000000 -0.1077090  0.0000000 -0.1077090 -0.2154179 -0.2154179
##   [547]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000 -0.8616717
##   [553]  0.0000000 -1.1847986  0.0000000  0.0000000  0.0000000  0.0000000
##   [559]  0.0000000  0.0000000 -0.4308359  0.0000000 -0.2154179  0.0000000
##   [565] -0.4308359 -0.2154179 -0.3231269 -0.2154179  0.0000000  0.0000000
##   [571] -0.3231269 -0.5385448 -0.1077090  0.0000000  0.0000000 -0.2154179
##   [577]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
##   [583]  0.0000000 -0.1077090  0.0000000  0.0000000  0.0000000  0.0000000
##   [589] -0.1077090  0.0000000 -0.1077090  0.0000000  0.0000000 -0.6462538
##   [595] -0.1077090 -0.1077090  0.0000000 -0.1077090 -0.1077090  0.0000000
##   [601]  0.0000000  0.0000000 -0.4308359 -0.1077090  0.0000000  0.0000000
##   [607] -0.1077090  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
##   [613]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000 -0.2154179
##   [619] -0.6462538  0.0000000  0.0000000  0.0000000  0.0000000 -0.1077090
```

```
## [625] -0.1077090 -0.2154179 -0.1077090  0.0000000 -1.4002165 -0.2154179
## [631]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [637]  0.0000000 -0.2154179 -0.1077090  0.0000000  0.0000000 -0.1077090
## [643]  0.0000000 -0.1077090 -0.4308359  0.0000000 -0.1077090 -0.3231269
## [649] -0.2154179  0.0000000 -1.1847986 -0.9693807  0.0000000 -0.8616717
## [655]  0.0000000 -0.1077090 -0.5385448 -0.2154179  0.0000000  0.0000000
## [661] -0.1077090  0.0000000  0.0000000 -0.2154179 -0.2154179 -1.2925076
## [667]  0.0000000 -0.2154179  0.0000000  0.0000000  0.0000000  0.0000000
## [673] -0.7539627 -0.2154179  0.0000000 -0.2154179 -0.2154179 -0.5385448
## [679]  0.0000000  0.0000000  0.0000000 -0.1077090 -0.1077090 -0.1077090
## [685]  0.0000000  0.0000000  0.0000000  0.0000000 -0.1077090 -0.1077090
## [691]  0.0000000  0.0000000 -1.1847986  0.0000000  0.0000000  0.0000000
## [697] -0.1077090  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [703] -1.4002165  0.0000000 -0.1077090 -0.1077090  0.0000000  0.0000000
## [709] -0.2154179  0.0000000 -0.1077090  0.0000000 -0.3231269 -0.1077090
## [715] -0.4308359 -0.7539627  0.0000000  0.0000000 -0.3231269  0.0000000
## [721]  0.0000000 -0.1077090  0.0000000  0.0000000  0.0000000  0.0000000
## [727] -0.4308359  0.0000000 -1.2925076 -0.1077090  0.0000000  0.0000000
## [733] -1.2925076 -0.2154179  0.0000000  0.0000000  0.0000000  0.0000000
## [739] -0.6462538  0.0000000  0.0000000 -0.1077090  0.0000000  0.0000000
## [745]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000 -0.1077090
## [751]  0.0000000 -0.2154179 -0.1077090 -0.5385448  0.0000000 -0.1077090
## [757]  0.0000000 -0.4308359  0.0000000  0.0000000  0.0000000  0.0000000
## [763]  0.0000000 -0.2154179  0.0000000  0.0000000 -0.2154179  0.0000000
## [769]  0.0000000  0.0000000  0.0000000 -0.2154179  0.0000000 -0.1077090
## [775]  0.0000000 -0.6462538  0.0000000  0.0000000  0.0000000  0.0000000
## [781]  0.0000000 -0.1077090  0.0000000  0.0000000 -0.3231269 -0.1077090
## [787] -0.1077090  0.0000000  0.0000000 -0.1077090  0.0000000  0.0000000
## [793] -0.3231269 -0.2154179  0.0000000 -0.1077090  0.0000000  0.0000000
## [799]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [805] -0.3231269  0.0000000 -0.1077090 -0.1077090  0.0000000  0.0000000
## [811]  0.0000000  0.0000000  0.0000000 -0.1077090 -0.7539627  0.0000000
## [817] -0.4308359 -0.2154179 -0.3231269 -0.1077090 -0.2154179 -1.6156344
## [823] -0.1077090  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [829]  0.0000000  0.0000000 -0.4308359  0.0000000  0.0000000 -0.4308359
## [835]  0.0000000 -0.4308359  0.0000000 -0.3231269 -0.1077090 -0.1077090
## [841]  0.0000000  0.0000000 -0.1077090  0.0000000 -0.1077090  0.0000000
## [847]  0.0000000  0.0000000  0.0000000 -0.4308359  0.0000000 -0.5385448
## [853]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [859] -0.2154179  0.0000000 -0.2154179  0.0000000  0.0000000  0.0000000
## [865] -0.1077090  0.0000000 -0.3231269  0.0000000  0.0000000 -0.2154179
## [871]  0.0000000  0.0000000 -0.8616717  0.0000000  0.0000000 -0.1077090
## [877] -0.3231269  0.0000000  0.0000000  0.0000000  0.0000000 -0.4308359
## [883] -0.3231269 -0.2154179  0.0000000  0.0000000 -0.6462538  0.0000000
## [889]  0.0000000  0.0000000 -0.4308359  0.0000000 -0.1077090  0.0000000
## [895]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000 -0.1077090
```

```
##  [901]  0.0000000 -0.4308359 -0.3231269  0.0000000 -0.1077090 -0.2154179
##  [907]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000 -0.1077090
##  [913]  0.0000000 -0.1077090  0.0000000  0.0000000  0.0000000  0.0000000
##  [919]  0.0000000 -0.2154179 -0.9693807 -0.1077090  0.0000000  0.0000000
##  [925]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
##  [931] -0.4308359  0.0000000  0.0000000  0.0000000 -0.2154179  0.0000000
##  [937]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000 -0.1077090
##  [943]  0.0000000 -0.3231269  0.0000000 -0.5385448  0.0000000  0.0000000
##  [949]  0.0000000 -0.2154179  0.0000000  0.0000000 -0.8616717 -0.2154179
##  [955] -0.1077090 -0.1077090 -0.4308359  0.0000000  0.0000000  0.0000000
##  [961]  0.0000000  0.0000000 -1.0770896  0.0000000 -0.1077090 -0.1077090
##  [967]  0.0000000 -0.6462538  0.0000000  0.0000000  0.0000000  0.0000000
##  [973]  0.0000000  0.0000000  0.0000000 -1.0770896  0.0000000  0.0000000
##  [979] -0.1077090 -0.4308359 -0.1077090  0.0000000 -0.1077090  0.0000000
##  [985]  0.0000000 -1.0770896  0.0000000  0.0000000  0.0000000  0.0000000
##  [991]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000 -0.2154179
##  [997] -0.5385448 -1.0770896 -0.1077090  0.0000000 -0.4308359 -0.2154179
## [1003]  0.0000000  0.0000000 -0.8616717  0.0000000  0.0000000 -1.7233434
## [1009]  0.0000000 -0.2154179  0.0000000 -0.1077090  0.0000000 -0.2154179
## [1015] -0.1077090 -0.2154179  0.0000000  0.0000000  0.0000000 -0.7539627
## [1021]  0.0000000  0.0000000 -0.1077090  0.0000000 -0.1077090 -0.3231269
## [1027]  0.0000000 -0.2154179  0.0000000 -0.1077090  0.0000000 -0.2154179
## [1033] -0.1077090 -0.4308359  0.0000000  0.0000000  0.0000000  0.0000000
## [1039]  0.0000000 -0.7539627  0.0000000 -0.1077090  0.0000000 -0.2154179
## [1045]  0.0000000 -0.1077090  0.0000000  0.0000000  0.0000000 -0.1077090
## [1051] -0.1077090  0.0000000  0.0000000 -0.2154179  0.0000000  0.0000000
## [1057]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000 -0.1077090
## [1063] -1.0770896 -0.1077090  0.0000000  0.0000000  0.0000000  0.0000000
## [1069] -0.2154179  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [1075] -1.0770896  0.0000000  0.0000000 -0.1077090 -0.1077090 -0.2154179
## [1081]  0.0000000  0.0000000 -0.1077090 -0.3231269  0.0000000 -0.5385448
## [1087]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000 -0.5385448
## [1093] -0.1077090 -0.1077090 -0.1077090  0.0000000  0.0000000  0.0000000
## [1099]  0.0000000  0.0000000 -0.1077090 -1.0770896  0.0000000 -0.6462538
## [1105] -0.3231269  0.0000000  0.0000000  0.0000000 -0.3231269 -0.3231269
## [1111] -0.3231269  0.0000000 -0.1077090  0.0000000  0.0000000  0.0000000
## [1117]  0.0000000  0.0000000  0.0000000  0.0000000 -2.5850151 -0.3231269
## [1123] -0.2154179 -0.8616717  0.0000000 -1.1847986  0.0000000 -0.1077090
## [1129] -0.6462538  0.0000000  0.0000000 -0.1077090  0.0000000  0.0000000
## [1135] -0.2154179 -0.1077090  0.0000000  0.0000000  0.0000000 -0.2154179
## [1141] -0.1077090 -0.1077090  0.0000000 -0.2154179  0.0000000  0.0000000
## [1147] -0.4308359  0.0000000 -0.8616717 -2.0464703  0.0000000  0.0000000
## [1153]  0.0000000 -0.1077090 -1.1847986 -0.2154179  0.0000000  0.0000000
## [1159] -0.1077090  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [1165] -0.1077090  0.0000000  0.0000000  0.0000000  0.0000000 -0.2154179
## [1171] -0.3231269  0.0000000 -0.9693807  0.0000000 -0.2154179  0.0000000
```

```
## [1177]  0.0000000  0.0000000  0.0000000 -0.2154179  0.0000000  0.0000000
## [1183] -0.2154179  0.0000000  0.0000000  0.0000000 -0.3231269  0.0000000
## [1189]  0.0000000  0.0000000 -0.3231269  0.0000000 -0.1077090  0.0000000
## [1195]  0.0000000 -0.1077090  0.0000000  0.0000000  0.0000000 -0.1077090
## [1201] -0.7539627  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [1207]  0.0000000  0.0000000  0.0000000 -0.2154179  0.0000000 -0.1077090
## [1213]  0.0000000 -0.1077090 -0.2154179  0.0000000  0.0000000  0.0000000
## [1219]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [1225]  0.0000000 -0.2154179 -0.5385448  0.0000000 -0.2154179  0.0000000
## [1231] -0.4308359  0.0000000 -0.1077090  0.0000000 -0.1077090  0.0000000
## [1237]  0.0000000  0.0000000 -0.1077090 -0.2154179 -0.1077090  0.0000000
## [1243] -0.1077090  0.0000000 -0.2154179  0.0000000  0.0000000  0.0000000
## [1249] -0.1077090 -0.3231269 -0.1077090  0.0000000  0.0000000 -0.1077090
## [1255]  0.0000000  0.0000000 -0.3231269  0.0000000 -0.1077090 -0.2154179
## [1261] -0.6462538 -0.4308359  0.0000000  0.0000000  0.0000000  0.0000000
## [1267]  0.0000000 -0.1077090  0.0000000  0.0000000 -0.2154179  0.0000000
## [1273] -0.1077090 -1.1847986  0.0000000 -1.2925076 -0.2154179 -0.1077090
## [1279] -0.4308359 -0.9693807  0.0000000 -0.4308359  0.0000000  0.0000000
## [1285]  0.0000000 -0.3231269  0.0000000  0.0000000 -0.2154179  0.0000000
## [1291]  0.0000000  0.0000000 -1.6156344  0.0000000 -0.8616717 -0.2154179
## [1297]  0.0000000  0.0000000  0.0000000 -0.1077090 -1.0770896  0.0000000
## [1303]  0.0000000 -0.8616717 -0.1077090  0.0000000 -0.1077090  0.0000000
## [1309]  0.0000000  0.0000000  0.0000000  0.0000000 -0.2154179  0.0000000
## [1315] -1.8310524  0.0000000 -0.2154179  0.0000000 -0.3231269  0.0000000
## [1321] -0.2154179  0.0000000  0.0000000 -0.6462538  0.0000000  0.0000000
## [1327]  0.0000000  0.0000000 -0.3231269 -0.4308359  0.0000000  0.0000000
## [1333]  0.0000000  0.0000000  0.0000000 -0.1077090 -0.2154179 -0.3231269
## [1339]  0.0000000 -0.1077090  0.0000000  0.0000000 -1.2925076  0.0000000
## [1345]  0.0000000 -0.1077090  0.0000000  0.0000000  0.0000000 -1.2925076
## [1351]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [1357] -0.1077090  0.0000000  0.0000000 -0.1077090 -1.4002165 -0.2154179
## [1363]  0.0000000  0.0000000  0.0000000  0.0000000 -0.2154179 -0.4308359
## [1369] -0.1077090 -1.2925076  0.0000000 -0.5385448 -0.5385448  0.0000000
## [1375]  0.0000000 -0.3231269  0.0000000  0.0000000  0.0000000 -0.3231269
## [1381]  0.0000000  0.0000000  0.0000000  0.0000000 -0.2154179 -0.2154179
## [1387] -0.2154179  0.0000000  0.0000000  0.0000000  0.0000000 -0.6462538
## [1393] -0.3231269 -1.1847986  0.0000000  0.0000000 -1.4002165  0.0000000
## [1399]  0.0000000 -0.1077090 -0.2154179  0.0000000  0.0000000  0.0000000
## [1405]  0.0000000 -0.3231269  0.0000000  0.0000000 -0.5385448 -0.2154179
## [1411] -0.2154179  0.0000000 -0.6462538  0.0000000  0.0000000 -0.1077090
## [1417]  0.0000000  0.0000000  0.0000000 -0.3231269 -2.1541793 -0.2154179
## [1423]  0.0000000 -0.1077090 -0.2154179 -0.3231269  0.0000000 -0.4308359
## [1429] -1.6156344 -0.5385448  0.0000000 -0.6462538  0.0000000  0.0000000
## [1435]  0.0000000  0.0000000 -0.5385448 -0.8616717 -0.1077090  0.0000000
## [1441]  0.0000000  0.0000000  0.0000000  0.0000000 -0.2154179 -1.8310524
## [1447]  0.0000000 -0.5385448 -1.4002165 -0.4308359 -0.1077090 -0.4308359
```

```
## [1453] -1.4002165  0.0000000  0.0000000  0.0000000  0.0000000 -0.4308359
## [1459] -0.4308359 -0.5385448 -1.1847986  0.0000000  0.0000000  0.0000000
## [1465] -0.2154179  0.0000000 -0.2154179 -0.4308359 -1.6156344 -0.8616717
## [1471] -0.1077090 -0.2154179 -0.4308359 -0.2154179  0.0000000  0.0000000
## [1477] -0.7539627 -0.1077090  0.0000000  0.0000000 -0.1077090  0.0000000
## [1483] -0.2154179 -0.3231269  0.0000000  0.0000000  0.0000000 -0.3231269
## [1489]  0.0000000  0.0000000 -1.2925076 -0.8616717 -0.6462538 -0.2154179
## [1495]  0.0000000  0.0000000  0.0000000  0.0000000 -1.6156344  0.0000000
## [1501] -0.1077090 -0.1077090  0.0000000  0.0000000 -0.1077090  0.0000000
## [1507] -0.3231269 -2.9081420  0.0000000  0.0000000 -0.2154179 -0.5385448
## [1513]  0.0000000 -0.5385448  0.0000000  0.0000000 -0.2154179 -0.4308359
## [1519]  0.0000000  0.0000000  0.0000000 -0.1077090  0.0000000 -0.1077090
## [1525]  0.0000000 -0.7539627 -1.1847986  0.0000000  0.0000000 -0.3231269
## [1531] -1.0770896  0.0000000 -1.2925076  0.0000000 -0.2154179 -0.2154179
## [1537]  0.0000000  0.0000000 -0.3231269 -0.2154179 -0.2154179  0.0000000
## [1543] -0.1077090  0.0000000 -0.6462538  0.0000000  0.0000000  0.0000000
## [1549]  0.0000000 -0.1077090  0.0000000 -0.2154179  0.0000000  0.0000000
## [1555]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000
## [1561]  0.0000000  0.0000000 -0.5385448 -0.1077090  0.0000000  0.0000000
## [1567] -1.4002165  0.0000000  0.0000000 -0.8616717  0.0000000 -0.6462538
## [1573] -0.2154179  0.0000000 -2.1541793 -0.1077090 -1.1847986 -1.6156344
## [1579]  0.0000000  0.0000000 -0.4308359  0.0000000  0.0000000  0.0000000
## [1585] -1.1847986  0.0000000 -0.4308359  0.0000000  0.0000000  0.0000000
## [1591]  0.0000000 -1.6156344 -1.0770896  0.0000000  0.0000000  0.0000000
## [1597] -0.4308359 -1.0770896 -0.4308359  0.0000000 -0.4308359  0.0000000
## [1603] -0.3231269 -0.1077090 -1.7233434 -0.2154179  0.0000000 -0.2154179
## [1609] -0.5385448 -0.4308359  0.0000000  0.0000000  0.0000000  0.0000000
## [1615]  0.0000000  0.0000000 -0.3231269 -0.2154179 -0.1077090 -0.6462538
## [1621] -1.7233434 -0.6462538 -2.4773061 -0.7539627  0.0000000 -1.8310524
## [1627]  0.0000000 -1.0770896 -0.3231269 -0.1077090 -0.2154179 -1.2925076
## [1633] -0.5385448  0.0000000 -1.0770896  0.0000000 -0.2154179  0.0000000
## [1639]  0.0000000 -2.1541793 -0.2154179  0.0000000 -0.3231269 -0.1077090
## [1645]  0.0000000 -2.0464703 -2.1541793 -0.2154179 -3.6621047  0.0000000
## [1651]  0.0000000 -1.5079255 -0.1077090 -1.1847986  0.0000000 -0.6462538
## [1657]  0.0000000 -0.4308359 -0.5385448  0.0000000  0.0000000 -0.1077090
## [1663] -0.7539627  0.0000000 -0.3231269 -1.0770896  0.0000000 -0.8616717
## [1669] -0.3231269  0.0000000 -0.3231269 -0.3231269 -0.2154179  0.0000000
## [1675] -0.3231269 -1.6156344 -0.9693807 -0.3231269 -0.6462538  0.0000000
## [1681] -0.2154179  0.0000000 -0.1077090 -0.8616717 -0.7539627 -0.2154179
## [1687]  0.0000000  0.0000000  0.0000000 -0.6462538 -2.6927241  0.0000000
## [1693]  0.0000000 -0.2154179  0.0000000 -0.1077090  0.0000000  0.0000000
## [1699] -0.2154179 -0.4308359 -0.8616717  0.0000000 -0.3231269  0.0000000
## [1705]  0.0000000 -0.6462538  0.0000000  0.0000000 -1.0770896 -0.3231269
## [1711] -0.9693807 -1.2925076  0.0000000  0.0000000 -0.1077090  0.0000000
## [1717] -0.1077090 -1.5079255  0.0000000  0.0000000 -1.1847986 -0.7539627
## [1723] -0.5385448  0.0000000 -1.0770896 -2.5850151 -0.6462538 -0.5385448
```

```
## [1729]  0.0000000 -0.1077090 -0.3231269  0.0000000  0.0000000  0.0000000
## [1735]  0.0000000 -1.5079255 -1.1847986 -1.6156344 -0.3231269  0.0000000
## [1741] -0.3231269 -0.2154179 -0.2154179 -1.4002165 -1.2925076 -0.4308359
## [1747] -0.7539627 -0.1077090 -0.5385448  0.0000000  0.0000000 -1.4002165
## [1753]  0.0000000 -0.1077090 -0.3231269 -0.2154179 -0.7539627 -0.7539627
## [1759] -0.4308359  0.0000000 -0.2154179 -0.5385448 -2.1541793 -0.6462538
## [1765] -0.3231269 -1.0770896  0.0000000 -0.2154179  0.0000000 -0.1077090
## [1771] -0.7539627 -1.2925076  0.0000000 -0.5385448  0.0000000 -0.2154179
## [1777] -0.6462538  0.0000000 -0.4308359 -0.2154179 -0.1077090 -0.2154179
## [1783] -0.1077090 -1.8310524  0.0000000 -1.1847986 -0.4308359  0.0000000
## [1789]  0.0000000 -0.6462538 -0.2154179 -0.2154179 -0.3231269 -0.1077090
## [1795] -0.3231269  0.0000000 -1.2925076 -1.5079255  0.0000000 -0.6462538
## [1801] -1.0770896  0.0000000 -0.1077090  0.0000000 -0.3231269  0.0000000
## [1807] -0.7539627 -0.6462538  0.0000000 -0.3231269 -0.7539627  0.0000000
## [1813] -0.3231269  0.0000000 -1.6156344 -0.6462538 -0.3231269 -0.9693807
## [1819]  0.0000000  0.0000000 -0.8616717  0.0000000 -0.5385448 -0.4308359
## [1825]  0.0000000 -0.3231269 -0.6462538 -0.2154179 -0.9693807  0.0000000
## [1831] -0.1077090  0.0000000 -0.2154179 -1.6156344 -0.4308359 -1.1847986
## [1837] -0.7539627 -0.8616717  0.0000000 -0.1077090  0.0000000 -0.1077090
## [1843] -0.3231269  0.0000000  0.0000000 -1.8310524 -0.7539627 -0.2154179
## [1849]  0.0000000 -0.5385448  0.0000000 -0.3231269 -0.4308359 -0.9693807
## [1855] -0.1077090 -0.1077090 -0.1077090  0.0000000 -0.9693807 -0.2154179
## [1861] -0.3231269 -0.6462538 -0.8616717 -0.3231269 -0.3231269  0.0000000
## [1867] -1.1847986 -0.4308359  0.0000000 -0.9693807 -0.1077090 -0.5385448
## [1873]  0.0000000 -0.7539627  0.0000000 -0.1077090 -1.0770896  0.0000000
## [1879] -0.2154179 -0.2154179 -2.0464703 -0.6462538 -0.5385448 -0.7539627
## [1885] -0.1077090 -1.1847986 -0.2154179 -0.6462538 -1.5079255 -1.0770896
## [1891] -1.2925076 -0.2154179 -0.1077090 -0.3231269  0.0000000 -0.1077090
## [1897] -0.8616717 -0.6462538 -0.2154179 -0.4308359 -1.6156344 -0.6462538
## [1903] -0.2154179 -0.9693807 -0.1077090 -0.3231269 -0.1077090 -0.5385448
## [1909]  0.0000000 -0.5385448 -1.2925076  0.0000000 -0.7539627 -0.1077090
## [1915] -0.2154179  0.0000000 -1.6156344  0.0000000 -0.1077090  0.0000000
## [1921]  0.0000000 -1.7233434  0.0000000 -0.5385448  0.0000000 -0.4308359
## [1927] -0.6462538 -1.0770896 -0.2154179 -0.9693807 -1.5079255 -1.1847986
## [1933]  0.0000000 -0.1077090 -0.7539627 -0.1077090  0.0000000 -0.7539627
## [1939] -0.3231269 -0.2154179  0.0000000 -1.6156344 -0.9693807  0.0000000
## [1945]  0.0000000 -1.0770896 -1.2925076  0.0000000 -0.1077090 -0.5385448
## [1951] -0.6462538  0.0000000  0.0000000 -0.6462538 -0.8616717  0.0000000
## [1957] -0.3231269 -0.7539627 -0.8616717 -0.1077090 -0.4308359 -0.1077090
## [1963]  0.0000000 -0.4308359  0.0000000 -0.2154179 -1.6156344 -1.6156344
## [1969]  0.0000000  0.0000000 -0.3231269  0.0000000 -0.3231269 -0.3231269
## [1975] -0.1077090 -1.2925076 -0.9693807 -2.5850151 -0.8616717 -0.5385448
## [1981] -1.2925076 -0.1077090 -0.9693807 -0.5385448 -0.2154179 -0.1077090
## [1987] -0.5385448  0.0000000  0.0000000  0.0000000  0.0000000 -1.0770896
## [1993] -1.0770896 -0.2154179 -1.2925076 -0.3231269  0.0000000 -1.1847986
## [1999] -0.2154179 -0.8616717  0.0000000  0.0000000 -0.1077090 -0.2154179
```

```
## [2005]  0.0000000 -0.8616717  0.0000000 -1.0770896 -0.8616717 -1.5079255
## [2011] -0.6462538 -1.5079255 -0.7539627  0.0000000 -0.2154179 -1.1847986
## [2017] -1.8310524 -2.9081420  0.0000000  0.0000000 -0.8616717 -0.1077090
## [2023] -0.2154179  0.0000000 -1.5079255 -0.2154179 -0.9693807 -0.2154179
## [2029]  0.0000000  0.0000000 -0.2154179 -0.4308359 -0.9693807  0.0000000
## [2035]  0.0000000  0.0000000 -0.9693807  0.0000000 -0.1077090  0.0000000
## [2041] -0.7539627 -1.0770896 -0.6462538 -0.7539627 -0.6462538  0.0000000
## [2047] -0.4308359 -0.8616717 -0.6462538  0.0000000  0.0000000 -0.7539627
## [2053] -3.6621047 -0.1077090 -0.4308359 -0.2154179 -1.2925076  0.0000000
## [2059]  0.0000000  0.0000000 -0.8616717 -0.3231269 -0.3231269 -0.2154179
## [2065] -0.8616717  0.0000000  0.0000000 -0.7539627 -0.5385448 -1.0770896
## [2071] -0.3231269 -0.8616717 -0.5385448 -0.5385448 -0.7539627  0.0000000
## [2077] -1.6156344 -0.2154179 -0.6462538  0.0000000  0.0000000 -0.5385448
## [2083]  0.0000000 -0.1077090 -0.1077090 -2.2618882 -0.2154179 -0.2154179
## [2089] -0.2154179  0.0000000 -0.5385448 -0.4308359 -2.4773061 -0.8616717
## [2095] -0.1077090 -0.7539627 -2.1541793 -0.7539627 -0.7539627  0.0000000
## [2101] -0.5385448 -0.7539627 -0.9693807 -1.2925076 -1.8310524 -0.1077090
## [2107] -1.1847986 -0.6462538 -1.4002165 -1.2925076 -1.2925076  0.0000000
## [2113] -0.7539627 -1.2925076 -0.9693807  0.0000000  0.0000000 -1.1847986
## [2119] -0.1077090  0.0000000 -0.2154179 -0.4308359  0.0000000 -0.1077090
## [2125] -0.5385448 -2.0464703  0.0000000 -0.4308359 -1.0770896 -0.1077090
## [2131] -0.3231269 -0.1077090 -1.0770896 -0.1077090  0.0000000  0.0000000
## [2137] -0.1077090  0.0000000  0.0000000 -0.3231269  0.0000000 -0.7539627
## [2143] -0.5385448 -0.9693807 -0.1077090 -1.0770896  0.0000000 -0.9693807
## [2149] -0.1077090  0.0000000 -0.6462538  0.0000000 -1.2925076 -0.2154179
## [2155] -0.5385448 -0.1077090  0.0000000 -0.3231269  0.0000000 -1.1847986
## [2161] -0.3231269  0.0000000  0.0000000 -0.5385448 -0.8616717 -0.5385448
## [2167] -0.9693807 -0.5385448 -0.3231269 -0.7539627  0.0000000 -0.8616717
## [2173] -0.4308359 -0.1077090 -0.1077090  0.0000000  0.0000000 -0.1077090
## [2179] -0.9693807 -0.7539627 -0.5385448 -0.8616717 -0.5385448  0.0000000
## [2185]  0.0000000 -0.1077090  0.0000000 -0.9693807  0.0000000 -0.8616717
## [2191] -0.4308359  0.0000000 -0.9693807 -1.2925076  0.0000000 -0.4308359
## [2197] -0.2154179  0.0000000  0.0000000  0.0000000 -0.1077090  0.0000000
## [2203] -0.1077090 -0.7539627  0.0000000  0.0000000  0.0000000 -1.4002165
## [2209]  0.0000000 -0.2154179 -0.1077090 -1.2925076 -0.5385448 -0.5385448
## [2215]  0.0000000 -0.2154179 -0.1077090 -0.3231269 -2.6927241 -0.9693807
## [2221] -0.3231269 -0.5385448 -1.1847986 -0.3231269 -0.5385448 -1.0770896
## [2227] -1.8310524  0.0000000 -0.7539627 -0.4308359 -1.6156344 -0.8616717
## [2233] -1.6156344 -0.8616717 -0.2154179 -0.4308359 -0.6462538 -1.4002165
## [2239]  0.0000000 -0.1077090 -0.1077090  0.0000000 -1.8310524  0.0000000
## [2245] -0.1077090 -0.4308359 -0.2154179 -0.8616717 -1.0770896 -0.4308359
## [2251] -0.3231269 -0.7539627 -0.2154179 -0.2154179 -0.3231269 -0.5385448
## [2257] -1.0770896  0.0000000 -0.3231269  0.0000000  0.0000000 -0.7539627
## [2263]  0.0000000 -0.3231269 -0.2154179  0.0000000 -0.9693807 -0.4308359
## [2269]  0.0000000  0.0000000 -0.9693807  0.0000000 -0.1077090  0.0000000
## [2275] -1.2925076  0.0000000 -0.9693807  0.0000000 -0.5385448 -0.2154179
```

```
## [2281]   0.0000000 -1.1847986 -0.1077090 -0.4308359 -0.1077090 -0.4308359
## [2287]   0.0000000  0.0000000  0.0000000 -0.7539627 -1.6156344 -0.1077090
## [2293]  -0.5385448 -1.2925076 -0.1077090 -0.4308359  0.0000000 -0.1077090
## [2299]  -0.5385448 -1.2925076 -0.1077090 -0.4308359 -1.2925076 -0.2154179
## [2305]  -1.8310524 -0.3231269 -2.4773061 -0.3231269 -0.1077090  0.0000000
## [2311]   0.0000000 -0.1077090 -0.2154179  0.0000000 -1.0770896 -0.6462538
## [2317]  -0.2154179 -0.6462538 -1.4002165 -1.7233434 -0.5385448  0.0000000
## [2323]  -0.2154179 -0.1077090 -0.6462538 -0.4308359  0.0000000 -0.3231269
## [2329]  -0.6462538 -0.2154179 -1.0770896 -1.1847986 -0.5385448 -0.4308359
## [2335]  -0.2154179 -1.0770896  0.0000000 -0.2154179  0.0000000 -0.2154179
## [2341]  -1.6156344 -0.4308359 -0.8616717 -0.4308359 -0.2154179 -0.1077090
## [2347]   0.0000000  0.0000000 -1.8310524 -0.1077090 -0.1077090  0.0000000
## [2353]  -0.4308359  0.0000000  0.0000000 -0.9693807 -0.2154179  0.0000000
## [2359]  -0.9693807 -0.9693807 -0.5385448 -0.1077090 -0.1077090 -0.1077090
## [2365]  -0.1077090 -0.3231269 -1.9387613 -0.2154179 -0.1077090 -0.5385448
## [2371]   0.0000000 -0.2154179  0.0000000  0.0000000  0.0000000 -0.5385448
## [2377]   0.0000000 -0.9693807 -1.2925076 -0.3231269 -0.2154179 -0.4308359
## [2383]   0.0000000 -0.9693807 -0.3231269 -0.1077090  0.0000000 -0.9693807
## [2389]  -0.1077090 -0.6462538 -1.0770896 -1.5079255 -0.4308359 -0.5385448
## [2395]  -0.5385448 -0.3231269 -0.5385448 -0.1077090 -0.6462538  0.0000000
## [2401]   0.0000000 -0.6462538  0.0000000 -0.1077090 -1.1847986 -0.5385448
## [2407]  -0.3231269 -0.7539627 -0.4308359 -0.6462538 -1.5079255  0.0000000
## [2413]  -0.7539627  0.0000000 -0.5385448 -0.1077090 -0.1077090  0.0000000
## [2419]   0.0000000  0.0000000 -0.2154179 -0.3231269  0.0000000 -1.2925076
## [2425]   0.0000000 -0.3231269 -0.2154179 -1.1847986 -0.9693807 -0.8616717
## [2431]  -0.2154179 -0.6462538 -0.7539627 -0.4308359 -1.0770896 -0.2154179
## [2437]   0.0000000 -0.1077090  0.0000000 -0.4308359 -0.3231269 -0.6462538
## [2443]  -0.1077090  0.0000000 -0.5385448 -1.6156344 -0.4308359  0.0000000
## [2449]   0.0000000 -0.7539627 -0.2154179  0.0000000  0.0000000 -0.3231269
## [2455]  -1.1847986 -0.9693807 -0.2154179 -0.2154179 -0.8616717  0.0000000
## [2461]  -1.8310524 -0.3231269 -0.4308359  0.0000000 -0.3231269  0.0000000
## [2467]  -0.1077090  0.0000000 -0.2154179 -0.1077090  0.0000000 -0.5385448
## [2473]  -0.3231269 -1.4002165 -1.1847986 -0.1077090 -1.4002165 -0.1077090
## [2479]   0.0000000 -0.3231269 -1.4002165 -0.2154179 -0.2154179 -1.8310524
## [2485]  -0.9693807  0.0000000  0.0000000 -0.5385448  0.0000000 -0.5385448
## [2491]  -0.6462538 -0.5385448 -0.7539627 -0.4308359 -2.5850151 -0.8616717
## [2497]  -2.4773061  0.0000000 -0.4308359 -0.1077090 -0.3231269 -0.1077090
## [2503]  -0.5385448 -0.6462538  0.0000000  0.0000000 -1.4002165  0.0000000
## [2509]   0.0000000 -0.6462538 -0.3231269 -0.1077090 -0.4308359  0.0000000
## [2515]  -0.2154179 -0.2154179  0.0000000 -0.5385448  0.0000000 -0.4308359
## [2521]   0.0000000 -0.8616717 -1.5079255 -0.6462538 -0.5385448 -0.3231269
## [2527]   0.0000000  0.0000000  0.0000000  0.0000000 -0.1077090  0.0000000
## [2533]  -0.1077090 -0.6462538 -0.3231269  0.0000000 -1.5079255 -0.6462538
## [2539]  -0.1077090 -1.1847986  0.0000000 -0.2154179 -0.1077090 -1.0770896
## [2545]  -0.1077090 -1.1847986 -1.0770896  0.0000000 -1.0770896 -0.9693807
## [2551]  -2.1541793 -2.0464703 -0.6462538  0.0000000  0.0000000  0.0000000
```

```
## [2557] -0.5385448 -0.5385448  0.0000000  0.0000000 -0.3231269 -1.2925076
## [2563] -1.2925076 -0.4308359 -0.4308359 -0.3231269  0.0000000 -0.8616717
## [2569] -0.3231269  0.0000000  0.0000000 -0.2154179 -0.9693807 -0.6462538
## [2575]  0.0000000 -0.2154179 -0.3231269  0.0000000 -0.2154179  0.0000000
## [2581]  0.0000000  0.0000000 -1.0770896 -1.4002165 -0.2154179  0.0000000
## [2587] -0.4308359 -1.5079255 -0.4308359 -0.6462538  0.0000000 -0.9693807
## [2593] -1.2925076  0.0000000 -0.6462538 -0.7539627 -0.5385448 -0.8616717
## [2599] -1.9387613 -1.0770896  0.0000000 -0.3231269 -0.2154179 -0.4308359
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## [2707]  0.0000000  0.0000000  0.0000000  0.0000000 -0.5385448  0.0000000
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## [2749]  0.0000000  0.0000000  0.0000000  0.0000000  0.0000000 -0.4308359
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## [2827]  0.0000000  0.0000000 -0.1077090  0.0000000 -0.3231269 -0.3231269
```

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## [2833] -0.8616717 -0.5385448  0.0000000  0.0000000  0.0000000  0.0000000
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```

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##    [8] 0.4801518 0.5435680 0.4710923 0.5979248 0.3804976 0.6704006 0.4982707
##   [15] 0.5163896 0.4439139 0.5526275 0.4710923 0.4620328 0.5616870 0.5163896
##   [22] 0.4257949 0.5526275 0.4710923 0.4710923 0.5707464 0.5526275 0.5435680
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## [120] 0.3804976 0.4801518 0.3895571 0.3170813 0.3442597 0.5526275 0.5254491
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## [519] 0.3804976 0.5798059 0.5163896 0.5707464 0.5979248 0.5526275 0.4892112
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## [694] 0.3804976 0.3986165 0.5979248 0.5526275 0.3895571 0.4167355 0.3442597
## [701] 0.4439139 0.3895571 0.5707464 0.3895571 0.5163896 0.3352003 0.6794600
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## [715] 0.4076760 0.3623787 0.6613411 0.3895571 0.4892112 0.4257949 0.5888654
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```

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##  [764] 0.3714381 0.3623787 0.5435680 0.5979248 0.3804976 0.6432222 0.5435680
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## [2311] 0.6522816 0.3442597 0.4620328 0.4529733 0.4801518 0.4439139 0.5526275
## [2318] 0.6069843 0.5073302 0.3804976 0.5435680 0.5616870 0.3261408 0.4076760
## [2325] 0.3533192 0.6069843 0.3895571 0.5526275 0.4710923 0.5254491 0.4982707
## [2332] 0.6975790 0.5254491 0.4439139 0.6069843 0.5435680 0.3261408 0.3442597
## [2339] 0.5073302 0.6160438 0.4439139 0.3261408 0.4167355 0.5435680 0.5526275
## [2346] 0.3352003 0.4710923 0.5979248 0.3986165 0.6975790 0.4167355 0.3804976
## [2353] 0.5073302 0.3804976 0.4529733 0.3170813 0.6975790 0.3986165 0.5526275
## [2360] 0.5616870 0.4076760 0.2808435 0.3895571 0.5798059 0.6069843 0.4529733
## [2367] 0.3352003 0.4076760 0.4892112 0.3623787 0.6613411 0.3352003 0.4801518
```

```
## [2374] 0.3533192 0.6251032 0.3623787 0.3895571 0.7156979 0.5888654 0.3261408
## [2381] 0.3804976 0.5798059 0.4167355 0.5073302 0.5526275 0.6432222 0.6975790
## [2388] 0.4801518 0.4167355 0.5526275 0.3804976 0.6069843 0.4892112 0.3533192
## [2395] 0.3080219 0.3986165 0.4801518 0.4348544 0.4348544 0.7066384 0.4348544
## [2402] 0.5526275 0.5163896 0.5073302 0.4529733 0.2899029 0.3442597 0.6069843
## [2409] 0.3714381 0.6432222 0.5163896 0.4801518 0.5979248 0.6069843 0.5707464
## [2416] 0.5435680 0.5798059 0.4257949 0.5345086 0.3895571 0.4439139 0.6069843
## [2423] 0.6432222 0.6069843 0.4710923 0.4710923 0.4710923 0.4439139 0.6975790
## [2430] 0.5707464 0.5798059 0.4801518 0.5345086 0.5073302 0.3986165 0.3895571
## [2437] 0.6160438 0.6704006 0.6251032 0.6522816 0.6704006 0.6251032 0.5163896
## [2444] 0.4801518 0.3533192 0.2536651 0.3895571 0.4076760 0.5616870 0.7519358
## [2451] 0.5526275 0.4076760 0.6613411 0.6432222 0.3986165 0.2899029 0.6522816
## [2458] 0.2989624 0.5979248 0.5526275 0.7156979 0.6975790 0.3895571 0.4257949
## [2465] 0.6704006 0.4076760 0.6069843 0.3623787 0.4348544 0.5254491 0.4167355
## [2472] 0.5798059 0.4529733 0.5345086 0.5435680 0.5345086 0.5254491 0.7338168
## [2479] 0.3986165 0.3170813 0.4620328 0.3986165 0.3804976 0.5163896 0.7247574
## [2486] 0.4439139 0.4620328 0.4892112 0.2899029 0.5888654 0.5798059 0.4710923
## [2493] 0.3714381 0.5073302 0.4801518 0.6251032 0.5254491 0.5073302 0.5798059
## [2500] 0.4710923 0.6432222 0.6794600 0.4257949 0.5435680 0.2808435 0.6613411
## [2507] 0.6704006 0.2627245 0.4710923 0.4167355 0.3170813 0.3804976 0.6613411
## [2514] 0.4257949 0.7247574 0.6613411 0.3895571 0.6704006 0.5979248 0.5254491
## [2521] 0.4620328 0.5435680 0.5616870 0.4801518 0.4710923 0.4710923 0.3895571
## [2528] 0.4982707 0.6251032 0.5616870 0.5888654 0.5888654 0.3804976 0.4439139
## [2535] 0.5163896 0.6704006 0.6613411 0.5073302 0.5707464 0.4620328 0.4167355
## [2542] 0.4801518 0.5707464 0.4801518 0.2808435 0.6613411 0.4710923 0.2899029
## [2549] 0.5254491 0.4620328 0.4620328 0.3442597 0.5888654 0.3170813 0.2446056
## [2556] 0.3442597 0.6432222 0.6069843 0.4801518 0.5435680 0.3623787 0.4529733
## [2563] 0.5254491 0.3804976 0.4076760 0.3895571 0.4529733 0.5888654 0.4167355
## [2570] 0.4076760 0.4348544 0.3442597 0.6613411 0.4076760 0.3623787 0.4167355
## [2577] 0.3352003 0.5073302 0.5798059 0.4710923 0.4167355 0.4167355 0.3714381
## [2584] 0.5073302 0.4257949 0.3714381 0.5254491 0.5979248 0.4982707 0.4167355
## [2591] 0.4167355 0.3804976 0.4982707 0.3804976 0.4892112 0.5616870 0.2899029
## [2598] 0.4076760 0.5163896 0.5254491 0.4529733 0.5254491 0.4529733 0.4167355
## [2605] 0.4892112 0.5707464 0.3895571 0.4710923 0.4620328 0.3442597 0.3714381
## [2612] 0.6251032 0.5798059 0.3170813 0.4620328 0.6069843 0.6251032 0.4167355
## [2619] 0.5979248 0.5979248 0.6975790 0.4076760 0.5888654 0.5163896 0.6251032
## [2626] 0.2717840 0.6794600 0.6432222 0.5254491 0.3804976 0.3533192 0.4801518
## [2633] 0.5798059 0.4892112 0.2989624 0.3080219 0.2899029 0.3442597 0.5345086
## [2640] 0.4892112 0.3714381 0.3714381 0.3895571 0.4257949 0.6432222 0.2627245
## [2647] 0.4439139 0.4710923 0.6522816 0.6251032 0.7156979 0.6160438 0.5435680
## [2654] 0.4982707 0.5616870 0.5707464 0.6341627 0.4620328 0.4982707 0.4529733
## [2661] 0.5345086 0.4801518 0.5707464 0.5707464 0.6975790 0.6341627 0.5798059
## [2668] 0.5345086 0.7338168 0.6704006 0.3533192 0.5526275 0.4076760 0.6522816
## [2675] 0.3352003 0.6885195 0.4892112 0.4710923 0.4620328 0.5345086 0.3986165
## [2682] 0.7247574 0.4439139 0.5707464 0.3352003 0.5798059 0.4257949 0.2536651
## [2689] 0.4167355 0.4892112 0.5888654 0.3714381 0.5707464 0.5254491 0.4801518
```

```
## [2696]  0.5345086 0.5526275 0.5163896 0.5073302 0.5163896 0.5254491 0.3533192
## [2703]  0.5073302 0.2989624 0.5073302 0.4076760 0.2808435 0.4076760 0.6522816
## [2710]  0.5163896 0.5435680 0.5798059 0.6160438 0.5073302 0.3986165 0.5073302
## [2717]  0.5979248 0.5345086 0.2627245 0.4710923 0.4167355 0.5345086 0.5254491
## [2724]  0.3442597 0.5798059 0.3080219 0.7247574 0.5435680 0.4167355 0.4257949
## [2731]  0.5073302 0.5526275 0.5798059 0.4348544 0.4167355 0.4620328 0.4167355
## [2738]  0.6160438 0.7338168 0.7247574 0.2355461 0.6160438 0.4167355 0.6432222
## [2745]  0.4439139 0.2989624 0.6341627 0.5798059 0.6975790 0.3714381 0.4257949
## [2752]  0.6341627 0.4257949 0.6069843 0.3442597 0.6432222 0.3895571 0.6704006
## [2759]  0.5888654 0.4257949 0.6522816 0.3895571 0.4439139 0.5073302 0.3080219
## [2766]  0.4982707 0.3533192 0.4529733 0.3170813 0.5163896 0.4801518 0.3080219
## [2773]  0.6160438 0.3714381 0.7156979 0.6160438 0.5616870 0.5254491 0.7066384
## [2780]  0.4439139 0.4710923 0.4801518 0.6704006 0.3986165 0.4348544 0.4620328
## [2787]  0.6341627 0.4710923 0.3986165 0.5707464 0.7338168 0.6432222 0.6613411
## [2794]  0.5526275 0.4348544 0.4801518 0.7066384 0.4529733 0.4167355 0.4892112
## [2801]  0.5435680 0.5345086 0.4529733 0.5435680 0.4257949 0.5616870 0.6794600
## [2808]  0.3352003 0.3442597 0.3623787 0.6613411 0.6341627 0.3352003 0.2627245
## [2815]  0.3804976 0.3623787 0.3442597 0.4257949 0.4167355 0.4348544 0.3442597
## [2822]  0.6341627 0.6341627 0.5073302 0.3895571 0.4892112 0.6975790 0.5616870
## [2829]  0.3804976 0.3170813 0.7156979 0.7519358 0.5979248 0.6341627 0.5979248
## [2836]  0.5798059 0.7247574 0.4710923 0.5798059 0.7247574 0.5979248 0.6069843
## [2843]  0.4439139 0.6704006 0.7156979 0.7066384 0.7338168 0.6160438 0.6160438
## [2850]  0.5254491 0.6341627 0.4801518 0.6251032 0.5798059 0.6069843 0.6160438
## [2857]  0.7156979 0.5526275 0.6251032 0.5979248 0.6794600 0.7338168 0.7156979
## [2864]  0.5707464 0.6794600 0.6432222 0.6160438 0.6975790 0.6522816 0.4076760
## [2871]  0.7609952 0.6251032 0.5435680 0.6704006 0.6069843 0.5979248 0.6069843
## [2878]  0.7881736 0.6069843 0.7156979 0.5254491 0.5888654 0.6432222 0.6704006
## [2885]  0.6704006 0.7247574 0.7881736 0.5073302 0.4167355 0.6975790 0.7156979
## [2892]  0.6341627 0.5979248 0.6613411 0.6613411 0.5979248 0.6704006 0.4620328
## [2899]  0.5979248 0.6975790 0.3352003 0.5616870 0.7066384 0.6975790 0.6522816
## [2906]  0.6704006 0.5707464 0.6069843 0.4710923 0.7609952 0.5345086 0.6975790
## [2913]  0.7156979 0.6704006 0.7247574 0.7428763 0.6704006 0.6613411 0.7700547
## [2920]  0.4982707 0.5073302 0.7519358 0.6069843 0.6160438 0.6160438 0.5526275
## [2927]  0.7428763 0.6341627 0.6432222 0.7247574 0.7881736 0.6975790 0.4892112
## [2934]  0.6160438 0.6251032 0.6522816 0.5979248 0.6613411 0.6704006 0.5435680
## [2941]  0.7247574 0.6613411 0.6885195 0.5979248 0.5888654 0.4710923 0.7700547
## [2948]  0.6975790 0.6160438 0.6341627 0.4801518 0.7066384 0.6341627 0.6794600
## [2955]  0.6704006 0.4620328 0.7791142 0.7247574 0.7338168 0.3986165 0.7066384
## [2962]  0.5254491 0.8062926 0.7066384 0.6522816 0.5163896 0.7156979 0.6794600
## [2969]  0.6704006 0.5616870 0.7519358 0.6885195 0.6885195 0.7609952 0.6794600
## [2976]  0.6251032 0.7247574 0.6613411 0.6794600 0.7156979 0.6432222 0.6160438
```

```
sdlog <- 1.340545
```

```
hlnorm = function(x,meanlog,sdlog) { dlnorm(x,meanlog=meanlog,sdlog=sdlog)/(1-plnorm(x,meanlog=me
plot( hlnorm(rotterdam$rtime,meanlog=meanlog,sdlog=sdlog))
```
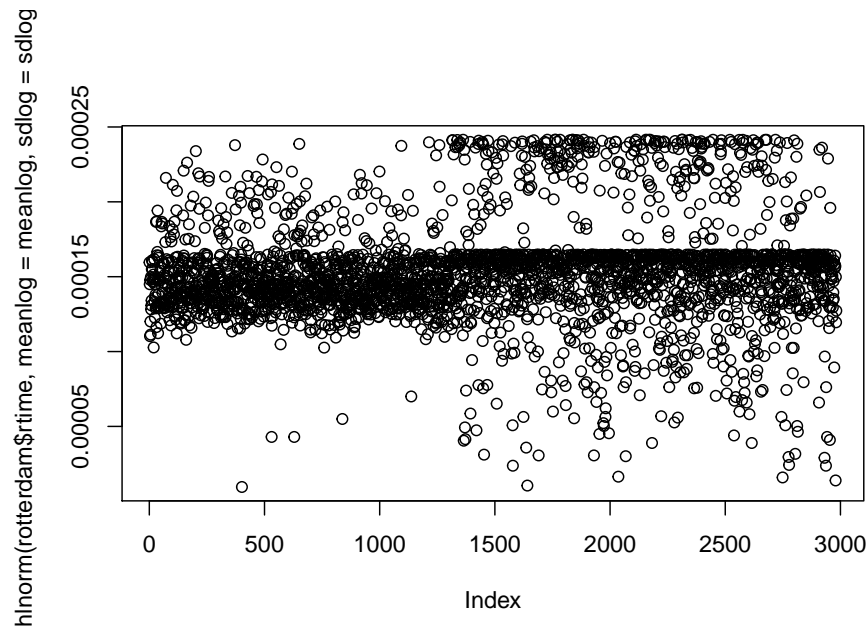
In the `rtime ~ Treatment + size + nodes + age` model, it is surprised to see that the coefficient of `age` is positive, though the value is small. One possible explanation could be the idea of "competing events" and "competing risk".

In this scenario, having recurred breast cancer and being dead could be somewhat "competing events". Though they are not completely "cannot happen on one person at the same time", it is still reasonable to think that for older patients, it is more likely to die from breast cancer or other complications than being cancer-free for years and then having breast cancer recurred; whereas for younger people, the risk of having recurrent breast cancer could be higher than being dead from the first breast cancer.

```
rotterdam_new <- rotterdam %>%
  mutate(state = ifelse(death == 1 & recur == 0, "death",
                  ifelse(death == 0 & recur == 1, "recur",
                  ifelse(death == 1 & recur == 1, "both", "neither"))))

ggplot(rotterdam_new, aes(x=age, color=state, fill=state)) +
  geom_density(alpha=0.3)
```
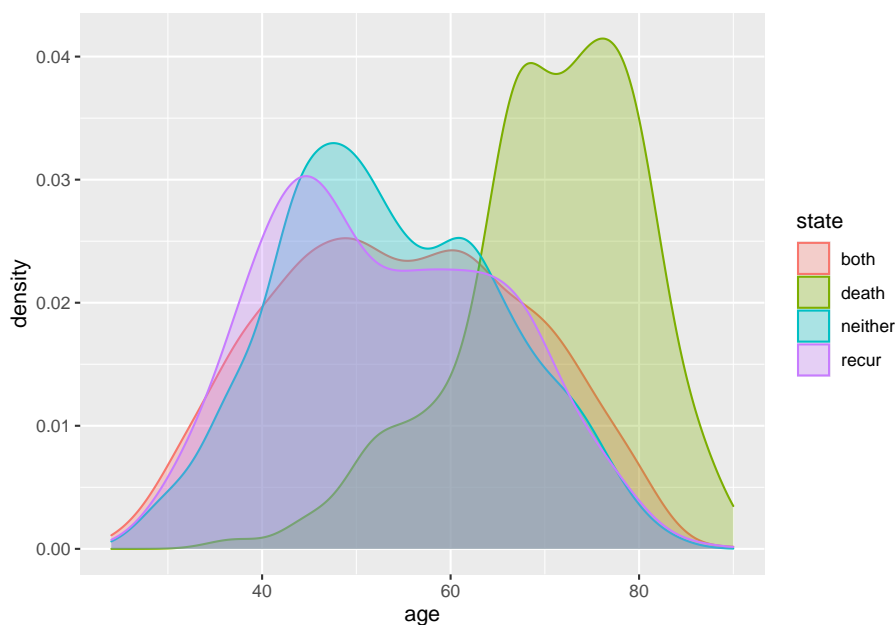
The plot above also helps verifying the idea. We can find that the group who has been dead during the study but has never had breast cancer recurred (the green one) tends to be older than others.

The positive coefficient of `age` in the log-normal model may seem indicating a protective effect of being old against having breast cancer recurred, but this should not be the true case. It is very likely that this is caused by the competing risk between being dead and having breast cancer recurred for people in different age group. The elderly patients are less likely to suffer from recurrent breast cancer because they are more likely to die from breast cancer or other complications during the treatment after the first diagnosis.

3.5 Cox-PH model:

```
m_death_withage = coxph(Surv(dtime, death) ~ Treatment + size + nodes + age, data=rotterdam)
m_death_withage
```

```
## Call:
## coxph(formula = Surv(dtime, death) ~ Treatment + size + nodes +
##     age, data = rotterdam)
##
##                                 coef exp(coef) se(coef)      z        p
## TreatmentChemo              0.546830  1.727768 0.360076  1.519    0.129
```

```
## TreatmentHormon                 0.519838  1.681756 0.366212  1.420     0.156
## TreatmentNaN/Other Treatment 0.496324  1.642672 0.356927  1.391     0.164
## size20-50                       0.477235  1.611612 0.065146  7.326 2.38e-13
## size>50                         0.865167  2.375402 0.090893  9.519  < 2e-16
## nodes                           0.074146  1.076964 0.004864 15.244  < 2e-16
## age                             0.014904  1.015016 0.002562  5.818 5.94e-09
##
## Likelihood ratio test=487.1  on 7 df, p=< 2.2e-16
## n= 2982, number of events= 1272
```

```
cox.zph(m_death_withage)
```

```
##            chisq df       p
## Treatment   4.45  3 0.21657
## size        4.81  2 0.09023
## nodes       3.32  1 0.06850
## age        15.12  1 0.00010
## GLOBAL     25.38  7 0.00065
```

```
new = data.frame(Treatment = "Both", size = "<=20", nodes=0, age=0)
plot(survfit(m_death_withage, newdata = new),fun="cumhaz", conf.int = FALSE, ylim = c(0
abline(0, 0.1/4000, col="blue")
```
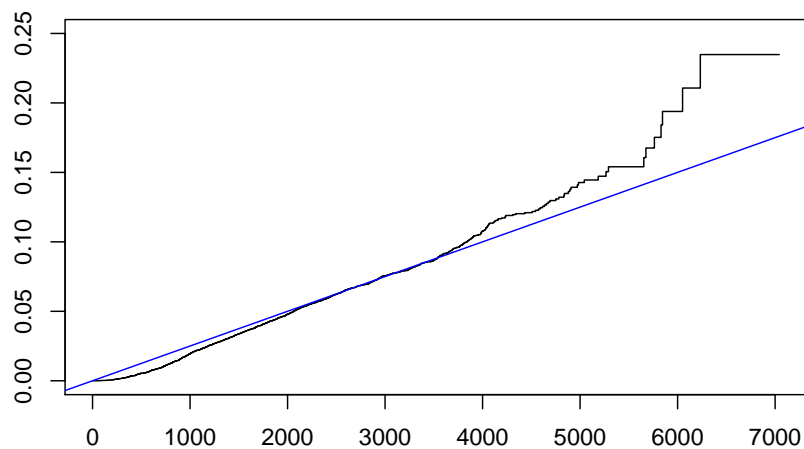
```
m_death_strataage = coxph(Surv(dtime, death) ~ Treatment + size + nodes + strata(age), data=rotte
m_death_strataage
```

```
## Call:
## coxph(formula = Surv(dtime, death) ~ Treatment + size + nodes +
##     strata(age), data = rotterdam)
##
##                                  coef exp(coef) se(coef)      z        p
## TreatmentChemo               0.566734  1.762501 0.368984  1.536    0.125
## TreatmentHormon              0.571493  1.770909 0.375700  1.521    0.128
## TreatmentNaN/Other Treatment 0.497674  1.644890 0.365574  1.361    0.173
## size20-50                    0.464177  1.590704 0.066890  6.939 3.94e-12
## size>50                      0.772204  2.164532 0.097352  7.932 2.16e-15
## nodes                        0.078158  1.081294 0.005365 14.567  < 2e-16
##
## Likelihood ratio test=391.7  on 6 df, p=< 2.2e-16
## n= 2982, number of events= 1272
```

```
cox.zph(m_death_strataage)
```

```
##           chisq df    p
## Treatment  3.60  3 0.31
## size       4.32  2 0.12
## nodes      1.37  1 0.24
## GLOBAL     9.64  6 0.14
```

```
m_recur = coxph(Surv(rtime, recur) ~ Treatment + size + nodes + age, data=rotterdam)
m_recur
```

```
## Call:
## coxph(formula = Surv(rtime, recur) ~ Treatment + size + nodes +
##     age, data = rotterdam)
##
##                                   coef exp(coef)  se(coef)      z        p
## TreatmentChemo                0.324447  1.383266  0.283541  1.144 0.252512
## TreatmentHormon               0.436864  1.547846  0.290953  1.501 0.133227
## TreatmentNaN/Other Treatment  0.459422  1.583159  0.280366  1.639 0.101286
## size20-50                     0.399867  1.491626  0.057857  6.911 4.80e-12
## size>50                       0.684610  1.982999  0.087589  7.816 5.44e-15
## nodes                         0.080239  1.083546  0.004575 17.539  < 2e-16
## age                          -0.008653  0.991385  0.002314 -3.739 0.000184
##
## Likelihood ratio test=429.7  on 7 df, p=< 2.2e-16
## n= 2982, number of events= 1518
```

```r
cox.zph(m_recur)
```

```
##           chisq df       p
## Treatment 7.943 3   0.047
## size      26.427 2 1.8e-06
## nodes      5.297 1   0.021
## age        0.104 1   0.747
## GLOBAL    42.374 7 4.4e-07
```

```r
m_recur = coxph(Surv(rtime, recur) ~ strata(Treatment) + strata(size) + nodes + age, da
m_recur
```

```
## Call:
## coxph(formula = Surv(rtime, recur) ~ strata(Treatment) + strata(size) +
##     nodes + age, data = rotterdam)
##
##             coef exp(coef)  se(coef)      z        p
## nodes  0.078816  1.082006  0.004645 16.969  < 2e-16
## age   -0.009373  0.990671  0.002335 -4.013 5.98e-05
##
## Likelihood ratio test=224.1  on 2 df, p=< 2.2e-16
## n= 2982, number of events= 1518
```

```r
cox.zph(m_recur)
```

```
##        chisq df    p
## nodes  2.626  1 0.11
## age    0.886  1 0.35
## GLOBAL 3.828  2 0.15
```

Chapter 4

Conclusion

nb

4.1   Limitation

- As we have mentioned in Motivation, the TNM system for diagnosis of breast cancer relies on three important indicators, **Tumor**, **Node**, **Metastasis**. Now in our research, the dataset already contains information about tumor size and number of lymph nodes tested positive, but it does not contain any information about metastasis. However, as we have mentioned in Chapter 2, these information would not exist until a patient has developed a stage IV breast cancer. We don't know exactly if these patients were left out for a reason, but we still think that a more generalized subject pool would make the result of the research more convincing and more generalized. For future studies, we think that not only stage IV breast cancer patients but also stage I patients should all be recorded as part of the dataset.

- In Chapter 2, we compared the effect and the condition for choosing between chemotherapy and hormontherapy. We have had good results discerning the patients taking different therapy by age, as younger patients tend to take chemotherapy more and older patients tend to take hormontherapy more. And we have also seen that most patients with no lymph nodes tested positive choose neither of chemotherapy and hormontherapy. There might be other therapies that better suit mild condition patients. Additionally, nowadays, there are way more categories of therapies for breast cancer and many of them may have better effect on patients and less discerning characteristics like age with chemotherapy and hormontherapy. In future studies, these missing treatment shall be recorded, as

it is critical to studying if the new methods are more effective and lasting treatment for breast cancer patients.

- In Chapter 3, we found out that in parametric models for recurrence vs. predictors, the coefficient for age is positive, which suggests that the older one patient is, the less likely he/she have recurred cancer. This counter-intuitive fact was explained by introducing the concept of competing risks. However, in the data that we obtained, there is no record of each patients' cause of death, and thus we could not conduct further analysis on what would be possible competing event that makes this relationship exist. In future study, if possible, researcher should try to record for patients with exact time of death their cause of death. In this manner, we might be able to study the causes of death for patients with breast cancer but did not die from the cancer itself.

4.2   Reference

- "Breast Cancer - Stages." Cancer.Net, 14 Aug. 2020, www.cancer.net/cancer-types/breast-cancer/stages#:~:text=There are 5 stages of,to plan the best treatments.

- "Breast Cancer Statistics." Centers for Disease Control and Prevention, Centers for Disease Control and Prevention, 8 June 2020, www.cdc.gov/cancer/breast/statistics/index.htm.

- "Breast Cancer Survival Statistics." Cancer Research UK, 22 Jan. 2021, www.cancerresearchuk.org/health-professional/cancer-statistics/statistics-by-cancer-type/breast-cancer/survival#heading-Zero.

- "Cancer." World Health Organization, World Health Organization, www.who.int/news-room/fact-sheets/detail/cancer.

- Martin, Laura J. "Breast Cancer: What Are the Survival Rates?" WebMD, WebMD, 13 May 2020, www.webmd.com/breast-cancer/guide/breast-cancer-survival-rates#:~:text=The 10-year breast cancer,are alive after 10 years).