TDDE15-Lab 1

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- Healthy –> healthy: 0.9
- Infected -> infected: 0.8
- p(Test = pos | infected) = 0.6
- p(Test = negative | healthy) = 0.7

Question: p(healthy in three days| negative test third day)

```
library(bnlearn)
library(gRain)
```

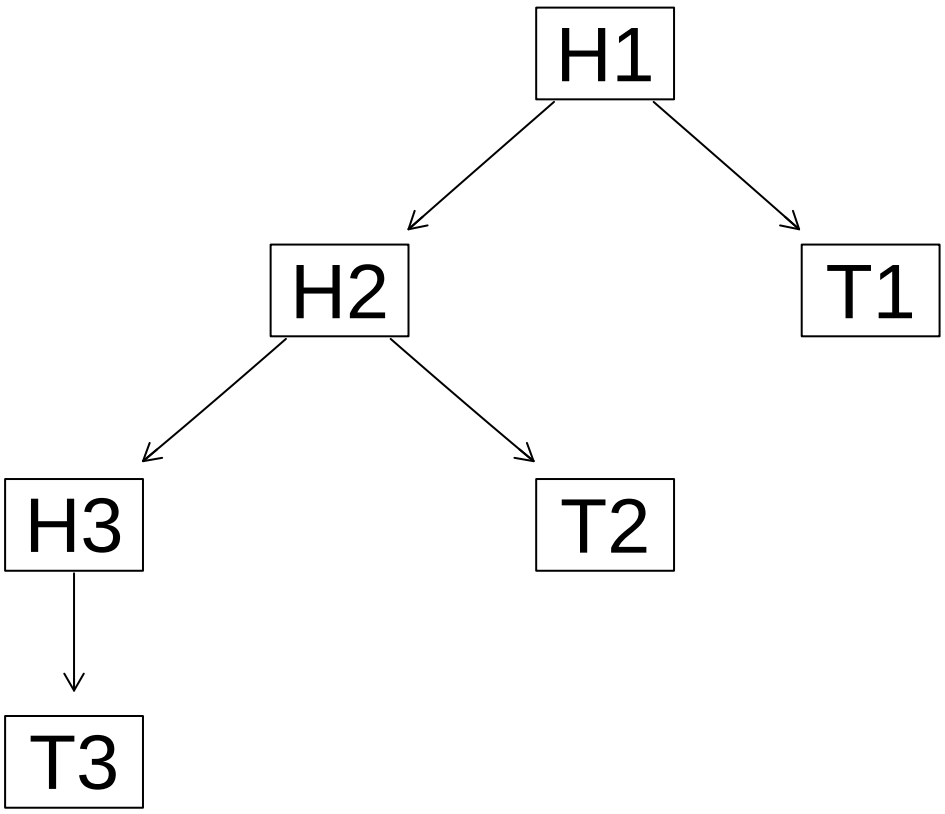
```
## Loading required package: gRbase
```

```
##
## Attaching package: 'gRbase'
```

```
## The following objects are masked from 'package:bnlearn':
##
##     ancestors, children, nodes, parents
```

```
dag = model2network("[H1][H2|H1][H3|H2][T1|H1][T2|H2][T3|H3]")
graphviz.plot(dag)
```

```
## Loading required namespace: Rgraphviz
```




```
# 1 if healthy
H1 <- c(0.5, 0.5)
dim(H1) <- c(2)
dimnames(H1) <- list(c("0", "1"))

H2 <- matrix(c(0.8, 0.2,
               0.1, 0.9), nrow = 2, ncol = 2)
dim(H2) <- c(2,2)
dimnames(H2) <- list("H2" = c("0", "1"), "H1" = c("0", "1"))

H3 <- matrix(c(0.8, 0.2,
               0.1, 0.9), nrow = 2, ncol = 2)
dim(H3) <- c(2,2)
dimnames(H3) <- list("H3" = c("0", "1"), "H2" = c("0", "1"))

# 1 if testing positive
T1 <- matrix(c(0.4, 0.6,
               0.7, 0.3), nrow = 2, ncol = 2)
dim(T1) <- c(2,2)
dimnames(T1) <- list("T1" = c("0", "1"), "H1" = c("0", "1"))

T2 <- matrix(c(0.4, 0.6,
               0.7, 0.3), nrow = 2, ncol = 2)
dim(T2) <- c(2,2)
dimnames(T2) <- list("T2" = c("0", "1"), "H2" = c("0", "1"))

T3 <- matrix(c(0.4, 0.6,
               0.7, 0.3), nrow = 2, ncol = 2)
```

```
dim(T3) <- c(2,2)
dimnames(T3) <- list("T3" = c("0", "1"), "H3" = c("0", "1"))

bn <- custom.fit(dag, list(H1=H1, H2=H2, H3=H3, T1=T1, T2=T2, T3=T3))

bn_comp <- compile(as.grain(bn))
```

```
nodes <- c("T2")#, "T3")
states <- c("0")#, "0")

querygrain(bn_comp, c("H3"))
```

```
## $H3
## H3
##     0     1
## 0.415 0.585
```

```
querygrain(setEvidence(bn_comp,nodes=c("T2"),states=c("0")),c("H3"))
```

```
## $H3
## H3
##         0         1
## 0.3230088 0.6769912
```

```
querygrain(setEvidence(bn_comp,nodes=c("T2", "T3"),states=c("0", "0")),c("H3"))
```

```
## $H3
## H3
##         0         1
## 0.2142333 0.7857667
```

- The probability that she is healthy after 3 days is 58.5%
- The probability that she is healthy after three days given a negative test on the second day is 68%
- The probability that she is healthy after three days given negative test on the second and third day is 79%.