Aufgabe 2

Paul Hörmann

Zeitaufwand: ca. 3h

Nr. 1

```
a1a = c(4:20)
a1a
```

```
##  [1]  4  5  6  7  8  9 10 11 12 13 14 15 16 17 18 19 20
```

```
a1b = c(20:4)
a1b
```

```
##  [1] 20 19 18 17 16 15 14 13 12 11 10  9  8  7  6  5  4
```

```
a1c = c(4:20, 19:4)
a1c
```

```
##  [1]  4  5  6  7  8  9 10 11 12 13 14 15 16 17 18 19 20 19 18 17 16 15 14
## [24] 13 12 11 10  9  8  7  6  5  4
```

```
# a1d
temp <- c(5,3,9)
```

```
a1e <- rep(temp, times=10)
a1e
```

```
##  [1] 5 3 9 5 3 9 5 3 9 5 3 9 5 3 9 5 3 9 5 3 9 5 3 9 5 3 9 5 3 9
```

```
a1f <- rep(temp, times=11, length=31)
a1f
```

```
##  [1] 5 3 9 5 3 9 5 3 9 5 3 9 5 3 9 5 3 9 5 3 9 5 3 9 5 3 9 5 3 9 5
```

```
a1g <- c(rep(5, times=5), rep(3, times=3), rep(9, times=9))
a1g
```

```
##  [1] 5 5 5 5 5 3 3 3 9 9 9 9 9 9 9 9 9
```

```
x <- seq(3.0,6.0,0.5)
a1h <- c(exp(x) * sin(x))
a1h
```

```
## [1]    2.834471  -11.616345  -41.320016  -87.994457 -142.316981 -172.640026
## [7] -112.724257
```

Nr. 2

```
x <- seq(3, 34, 3)
a2a <- c(2^x * 0.1^(x-2))
a2a
```

```
##  [1] 8.000000e-01 6.400000e-03 5.120000e-05 4.096000e-07 3.276800e-09
##  [6] 2.621440e-11 2.097152e-13 1.677722e-15 1.342177e-17 1.073742e-19
```

```
## [11] 8.589935e-22
```

```
i <- c(10:25)
a2b <- c(i^2 + 5*i^3)
a2b
```

```
##  [1]  5100  6776  8784 11154 13916 17100 20736 24854 29484 34656 40400
## [12] 46746 53724 61364 69696 78750
```

```
i <- c(1:10)
a2c <- c((2^i/i^3) + (i^2/3^i))
a2c
```

```
##  [1] 2.3333333 0.9444444 0.6296296 0.4475309 0.3588807 0.3456790 0.3955830
##  [8] 0.5097546 0.7064472 1.0256935
```

```
# a2d
set.seed(1)
xVec <- sample(1:100,100,replace=T)
i <- c(1:99)
sumX <- sum(c(exp(-xVec[i + 1])/xVec[i] + 2))
sumX
```

```
## [1] 198.056
```

```
xVec[xVec > 90]
```

```
## [1]  97 100  93  94  96  93
```

```
which(xVec > 90)
```

```
## [1] 11 62 73 87 88 91
```

```
length(which(xVec > max(xVec) - 20))
```

```
## [1] 22
```

```
xVec[seq(1, 100, 3)]
```

```
##  [1] 68 34 14 51 21  7 85 37 44 84 74 20 44 40 70 42 32 45 78 87 81 40 89
## [24] 29 93 33 31 87 48 96 93  1 26 29
```

Nr. 3

```
a3a <- matrix(ncol = 3, nrow = 3)
a3a[,1] = c(4, 12, 16)
a3a[,2] = c(10, 20, 10)
a3a[,3] = c(10, 5, 15)
a3a
```

```
##      [,1] [,2] [,3]
## [1,]    4   10   10
## [2,]   12   20    5
## [3,]   16   10   15
```

```
colnames(a3a) <- c("Abt1", "Abt2", "Abt3")

a3b <- cbind(a3a, c(16, 63, 9))
a3b
```

```
##      Abt1 Abt2 Abt3
## [1,]    4   10   10 16
## [2,]   12   20    5 63
## [3,]   16   10   15  9
```

```
a3c <- rowSums(a3b)
a3c
```

```
## [1]  40 100  50
```

```
a3d <- a3c^-1 * diag(3) * a3a
a3d
```

```
##      Abt1 Abt2 Abt3
## [1,]  0.1  0.0  0.0
## [2,]  0.0  0.2  0.0
## [3,]  0.0  0.0  0.3
```

```
a3e <- diag(3) - a3d
a3e
```

```
##      Abt1 Abt2 Abt3
## [1,]  0.9  0.0  0.0
## [2,]  0.0  0.8  0.0
## [3,]  0.0  0.0  0.7
```

```
a3f <- a3e * a3c
a3f
```

```
##      Abt1 Abt2 Abt3
## [1,]   36    0    0
## [2,]    0   80    0
## [3,]    0    0   35
```

```
a3g <- (diag(3) - a3d)^-1
a3g
```

```
##          Abt1 Abt2     Abt3
## [1,] 1.111111  Inf      Inf
## [2,]      Inf 1.25      Inf
## [3,]      Inf  Inf 1.428571
```

```
a3h <- a3g * c(16,40,40)
a3h
```

```
##          Abt1 Abt2     Abt3
## [1,] 17.77778  Inf      Inf
## [2,]      Inf   50      Inf
## [3,]      Inf  Inf 57.14286
```