```r
set.seed(131131)

ks_test <- function(x, F0) {
    Fn <- ecdf(x)
    ext <- max(abs(Fn(x) - F0(x)))
    return(ext)
}

cvm_test <- function(x, F0) {
    n <- length(x)
    z <- F0(sort(x))
    ext <- sum((z - (2 * (1:n) - 1) / (2 * n)) ^ 2) + 1 / (12 * n)
    return(ext)
}

ad_test <- function(x, F0) {
    n <- length(x)
    z <- F0(sort(x))
    ext <- -n - mean((2 * (1:n) - 1) * (log(z) + log(1 - rev(z))))
    return(ext)
}

# N(0,1)
generate_1 <- function(n) {
    return(rnorm(n, mean = 0, sd = 1))
}

# N(0,5^2)
generate_2 <- function(n) {
    return(rnorm(n, mean = 0, sd = 5))
}

# 0.99*N(0.,1) + 0.01*N(0,100)
generate_3 <- function(n, epsilon = 0.01, sigma = 100) {
    z <- rbinom(n, 1, 1 - epsilon)
    return(z * rnorm(n, 0, 1) + (1 - z) * rnorm(n, 0, sigma))
}

# L(0,1)
generate_4 <- function(n) {
    return(rlaplace(n, 0, 1))
}


# Stałe
n <- 100
M <- 1000
```

KS-test

```r
test_func <- ks_test
```

```r
rH0 <- 0
rH1 <- 0
crit <- 0.148
F0 <- function(x) pnorm(x, mean = 0, sd = 1)
H1 <- function(x) pnorm(x, mean = - 0.2, sd = 1)
gen1 <- generate_1
```

#Ta pętla bedzie wyłowyana dla każdego testu

```r
for (i in 1:M) {
    x_H0 <- gen1(n)
    testH0 <- test_func(x_H0, F0)
    statment0 <- (testH0 > crit)
    rH0 <- rH0 + statment0

    testH1 <- test_func(x_H0, H1)
    statment1 <- (testH1 > crit)
    rH1 <- rH1 + statment1
}
level <- rH0 / M
power <- rH1 / M

print(c(level, power))
```

```
## [1] 0.017 0.224
```

```r
rH0 <- 0
rH1 <- 0
crit <- 0.148
F0 <- function(x) pnorm(x, mean = 0, sd = 5)
H1 <- function(x) pnorm(x, mean = - 0.2, sd = 5)
gen1 <- generate_2
```

```
## [1] 0.020 0.026
```

```r
rH0 <- 0
rH1 <- 0
crit <- 0.148
Dis1 <- function(x) {
  return ((1 - 0.01) * pnorm(x, 0, 1) + 0.01 * pnorm(x, 0, 100))
}
F0 <- Dis1
Dis2 <- function(x) {
  return ((1 - 0.01) * pnorm(x, -0.2, 1) + 0.01 * pnorm(x, - 0.2, 100))
}
H1 <- Dis2
gen1 <- generate_3
```

```
## [1] 0.023 0.221
```

```r
library(VGAM)
```

```
## Loading required package: stats4
```

```
## Loading required package: splines
```

```r
rH0 <- 0
rH1 <- 0
```

```
crit <- 0.148
F0 <- function(x) plaplace(x, 0 , 1)
H1 <- function(x) plaplace(x, -0.2 , 1)
gen1 <- generate_4
```

```
## [1] 0.019 0.255
```

Cm test

```
test_func <- cvm_test
```

```
rH0 <- 0
rH1 <- 0
crit <- 0.148
F0 <- function(x) pnorm(x, mean = 0, sd = 1)
H1 <- function(x) pnorm(x, mean = - 0.2, sd = 1)
gen1 <- generate_1
```

```
## [1] 0.375 0.848
```

```
rH0 <- 0
rH1 <- 0
crit <- 0.148
F0 <- function(x) pnorm(x, mean = 0, sd = 5)
H1 <- function(x) pnorm(x, mean = - 0.2, sd = 5)
gen1 <- generate_2
```

```
## [1] 0.408 0.427
```

```
rH0 <- 0
rH1 <- 0
crit <- 0.148
Dis1 <- function(x) {
  return ((1 - 0.01) * pnorm(x, 0, 1) + 0.01 * pnorm(x, 0, 100))
}
F0 <- Dis1
Dis2 <- function(x) {
  return ((1 - 0.01) * pnorm(x, -0.2, 1) + 0.01 * pnorm(x, - 0.2, 100))
}
H1 <- Dis2
gen1 <- generate_3
```

```
## [1] 0.423 0.853
```

```
library(VGAM)
rH0 <- 0
rH1 <- 0
crit <- 0.148
F0 <- function(x) plaplace(x, 0 , 1)
H1 <- function(x) plaplace(x, -0.2 , 1)
gen1 <- generate_4
```

```
## [1] 0.410 0.826
```

ad test

```r
ad_test <- cvm_test
```

```r
rH0 <- 0
rH1 <- 0
crit <- 0.148
F0 <- function(x) pnorm(x, mean = 0, sd = 1)
H1 <- function(x) pnorm(x, mean = - 0.2, sd = 1)
gen1 <- generate_1
```

```
## [1] 0.411 0.841
```

```r
rH0 <- 0
rH1 <- 0
crit <- 0.148
F0 <- function(x) pnorm(x, mean = 0, sd = 5)
H1 <- function(x) pnorm(x, mean = - 0.2, sd = 5)
gen1 <- generate_2
```

```
## [1] 0.42 0.46
```

```r
rH0 <- 0
rH1 <- 0
crit <- 0.148
Dis1 <- function(x) {
  return ((1 - 0.01) * pnorm(x, 0, 1) + 0.01 * pnorm(x, 0, 100))
}
F0 <- Dis1
Dis2 <- function(x) {
  return ((1 - 0.01) * pnorm(x, -0.2, 1) + 0.01 * pnorm(x, - 0.2, 100))
}
H1 <- Dis2
gen1 <- generate_3
```

```
## [1] 0.410 0.844
```

```r
library(VGAM)
rH0 <- 0
rH1 <- 0
crit <- 0.148
F0 <- function(x) plaplace(x, 0 , 1)
H1 <- function(x) plaplace(x, -0.2 , 1)
gen1 <- generate_4
```

```
## [1] 0.387 0.841
```