Domača naloga 7

Alen Kahteran

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Določanje spremenljivk

```
# size of repetitions
reps_size <- 10^5
# vpisna st.
vpis_st <- "64200421"
# degrees of freedom from vpisna st.
dof <- as.integer(substr(vpis_st, nchar(vpis_st)-1, nchar(vpis_st)))
```

Definicija funkcije moj_hi_kvadrat()

```
moj_hi_kvadrat <- function(reps, n) {
    ### returns a vector of randomly distributed chi^2 values of size reps and DoF = n
    ### Input:
    ###     reps - size of chi^2 samples
    ###     n    - degrees of freedom

    # creating empty vector of size reps for saving values
    u <- rep(NA, reps)

    # loop over reps
    for (i in 1:reps){

        # create n random normally distributed values with mean=0 and standard deviation=0
        z <- rnorm(n, mean=0, sd=1)
        # square and then sum
        u[i] <-sum(z^2)
    }

    # return vector of values
    return(u)
}
```

Definicija funkcije empiricni_CDF()

```
empiricni_CDF <- function(vzorec, n) {
    ### not sure yet what it should return
    ### Input:
    ###     vzorec - vector of randomly distributed chi^2 values
    ###     n    - degrees of freedom
```

```
    # get total length of vzorec
    total_len <- length(vzorec)

    # define percentiles
    pcts <- seq(0, 0.95, 0.05)

    # create empty vector of length length(pcts)
    vectr <- rep(NA, length(pcts))

    # get theoretical values of 5pct values with n degrees of freedom
    qcs <- qchisq(pcts, n)

    # loop over theoretical values to get empirical CDF values
    for (pct in qcs) {
        vectr[which(qcs == pct)[[1]]] <- length(vzorec[vzorec <= pct])/total_len
    }

    # return vector of empirical cdf values
    return(vectr)
}
```

Primerjava moj_hi_kvadrat() in rchisq() z empiricni_CDF()

```
# setting seed for reproducability
set.seed(8)

# getting randomly generated values from moj_hi_kvadrat() and rchisq()
f_custom <- empiricni_CDF(moj_hi_kvadrat(reps_size, dof), dof)
f_builtin <- empiricni_CDF(rchisq(reps_size, dof), dof)

# defining percentiles
pcts <- seq(0, 0.95, 0.05)

# getting theoretical values of chi^2
theo_values <- qchisq(pcts, dof)
```

```r
# displaying table
knitr::kable(data.frame(Percentil=pcts,
                        Teoreticno=theo_values,
                        moj.F=f_custom,
                        F.rchisq=f_builtin))
```

Percentil	Teoreticno	moj.F	F.rchisq
0.00	0.00000	0.00000	0.00000
0.05	11.59131	0.04904	0.04964
0.10	13.23960	0.09924	0.09801
0.15	14.43931	0.15058	0.14893
0.20	15.44461	0.20023	0.19870
0.25	16.34438	0.25065	0.24873
0.30	17.18227	0.30044	0.29939
0.35	17.98426	0.35037	0.35030
0.40	18.76831	0.39940	0.39969
0.45	19.54848	0.44958	0.44875
0.50	20.33723	0.49902	0.50005
0.55	21.14698	0.54922	0.55031
0.60	21.99150	0.59972	0.60076
0.65	22.88761	0.64990	0.65086
0.70	23.85779	0.69987	0.70204
0.75	24.93478	0.75033	0.75195
0.80	26.17110	0.80010	0.80026
0.85	27.66201	0.84999	0.85017
0.90	29.61509	0.89996	0.90001
0.95	32.67057	0.94988	0.94993