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Extended Easily Changeable Kurtosis Distribution. Supplementary material

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1. Appendix

```
#auxiliary function to the dEECK
H=function(p,q){
    return(2*gamma(p+1)*gamma(1+1/q)/gamma(1+p+1/q))
}
#PDF
dEECK = function(x,p,q) {
  ifelse(abs(x)<=1,((1-abs(x)^q)^p)/H(p,q),0)
}
#auxiliary function to the pEECK
Gauss2F1 <- function(a,b,c,x){
  if(x>=0 & x<1){
    hyperg_2F1(a,b,c,x)
  }else{
    hyperg_2F1(c-a,b,c,1-1/(1-x))/(1-x)^b
  }
}
#CDF - variant 1
pEECK = function(x,p,q) {
  return (0.5+x*Gauss2F1(-p,1/q,1+1/q,abs(x)^q)/H(p,q))
}
#auxiliary function to the qEECK
u1 = function(x,p,q,u) {
```

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```
  w1=H(p,q)*(0.5-u)
  w2=x*Gauss2F1(-p,1/q,1+1/q,abs(x)^q)
  return (w1+w2)
}
#quantiles
qEECK=function(p,q,u){
  return(uniroot(u1, c(-1+0.001,1-0.001), tol = 0.0001, p=p, q=q, u=u)$root)
}
#CDF - variant 2
pEECK1<-function(x,p,q) {
  WCK<-function (x) return (dEECK(x,p,q))
  return (as.numeric(integrate(WCK, lower = -1, upper = x)[1]))
}
#auxiliary function to the rEECK
InvCdf=function (x,p,q) {
  x0=-1+0.01
  while (pEECK1(x0,p,q)<x) {x0=x0+0.01}
  return (x0)
}
#random number generator
rEECK<-function (n,p,q) {
  R<-runif(n,0,1)
  liczby<-c()
  for (i in 1:n) liczby<-c(liczby, InvCdf(R[i],p,q))
  return (sort(liczby))
}
#random number generator for p>=1
rEECK1=function(n,p,q){
  wyn=numeric(n)
  if (p>=0) d=dEECK(0,p,q)
  for (i in 1:n){
    R1 = runif(1,-1,1)
    R2 = runif(1,0,d)
    w = dEECK(R1,p,q)
    while(w<R2){
      R1 = runif(1,-1,1)
      R2 = runif(1,0,d)
      w = dEECK(R1,p,q)
    }
    wyn[i]=R1
  }
  return(sort(wyn))
}
```