Random numbers from inverse CDF

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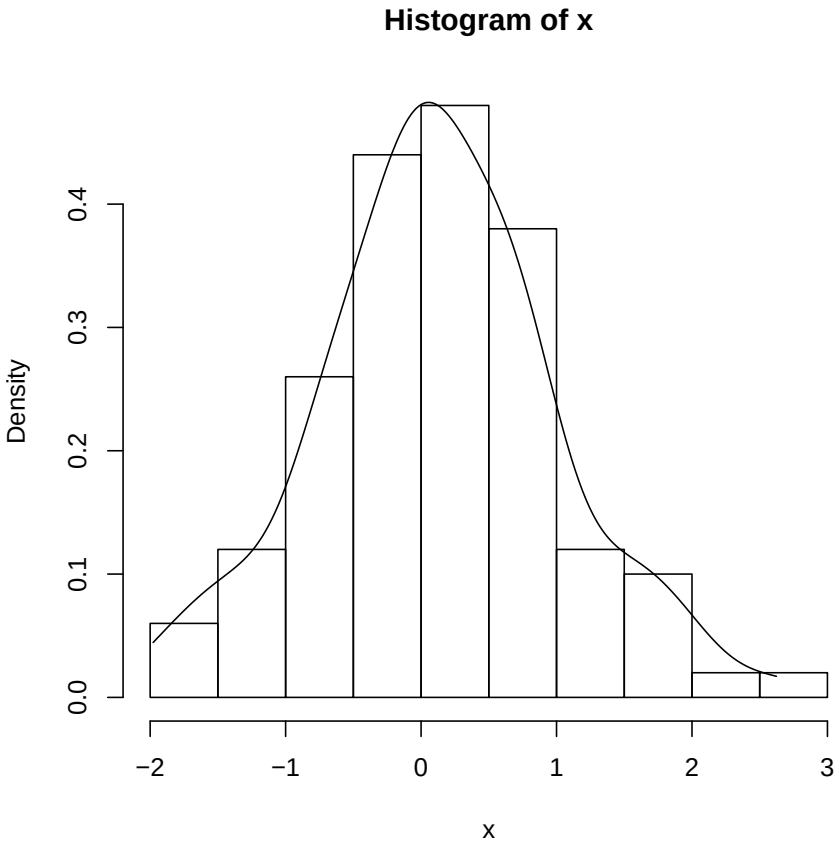
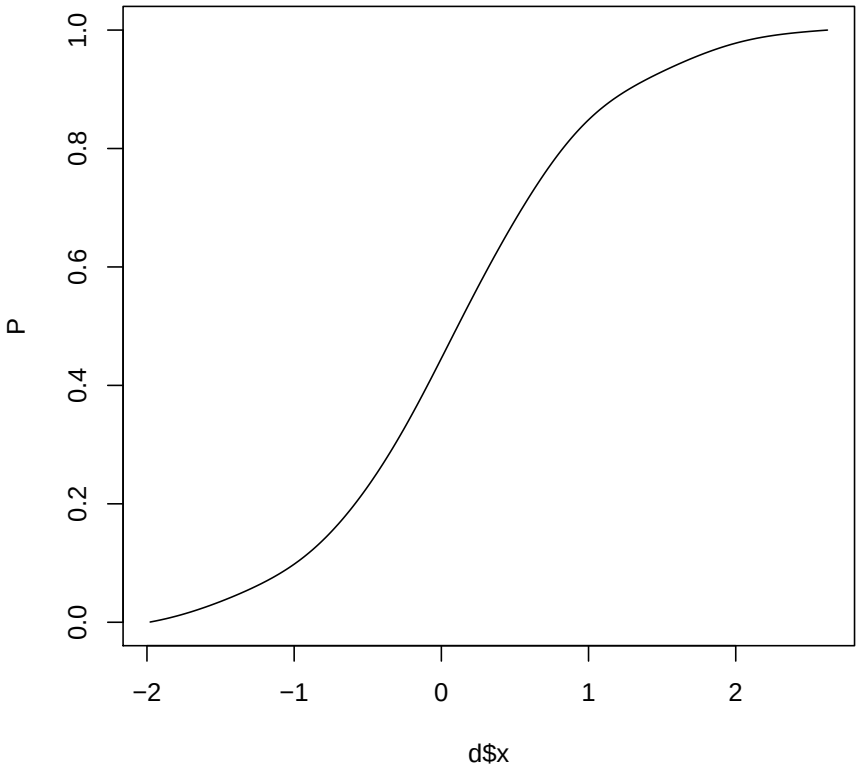
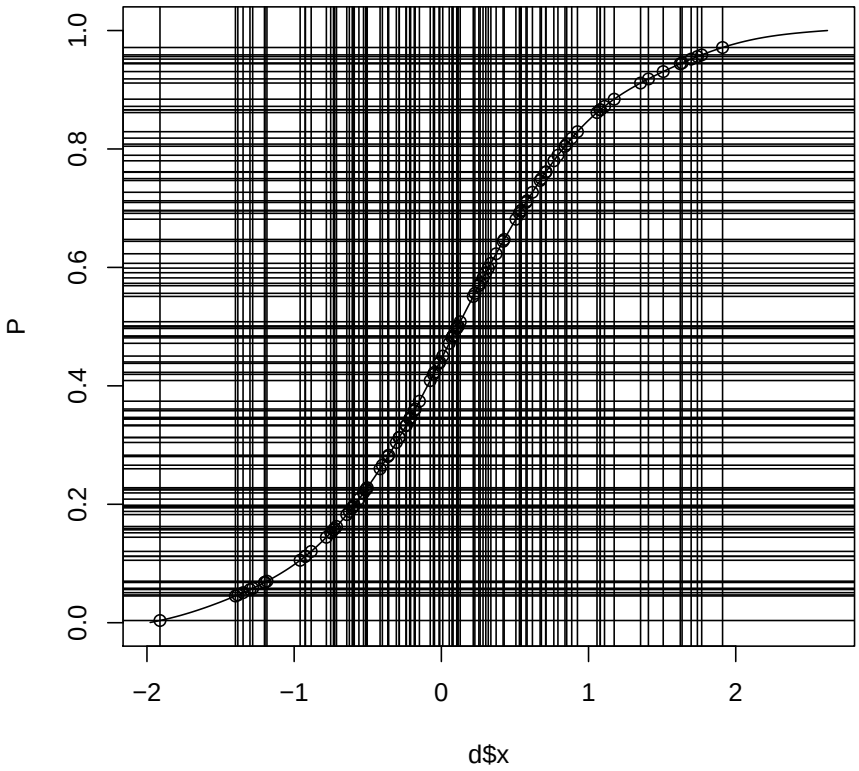
```
> x <- rnorm(100)
> hist(x,prob=TRUE)
> d <- density(x,from=min(x),to=max(x))
> lines(d)
>
```



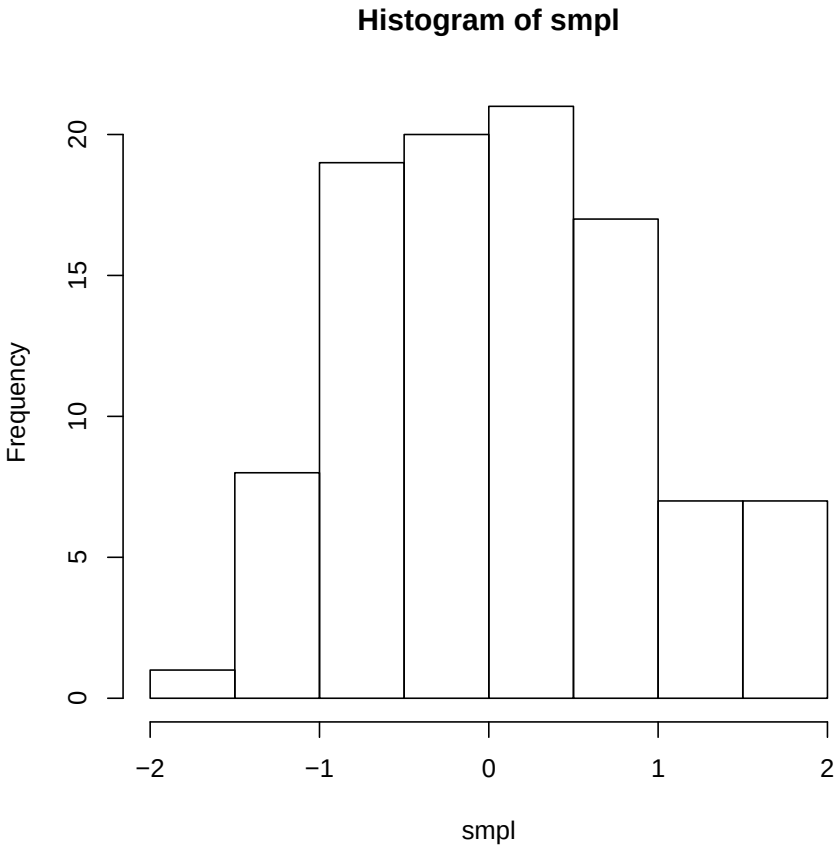
```
> F <- cumsum(d$y)
> P <- F/max(F)
> plot(d$x,P,type="l")
>
```




```
> n <- 100
> u <- runif(n)
> plot(d$x,P,type="l")
> abline(h=u)
> xout <- approx(P,d$x,u)
> points(xout$y,xout$x)
> abline(v=xout$y)
> smpl <- xout$y
```


P
0.0
0.2
0.4
0.6
0.8
1.0
−2
−1
0
1
2
d$x

```
> hist(smpl)
```


Histogram of smpl
Frequency
0
5
10
15
20
−2
−1
0
1
2
smpl

```
> rcdf <- function(n=1,x=rnorm(100),from=min(x),to=max(x),density=TRUE){
+ # n number of generated numbers or a vector of quantile ranks
+ N <- length(x)
+ if(density) {
+ d <- density(x,from=from,to=to)
+ F <- cumsum(d$y)
+ P <- F/max(F)
+ P[1] <- 0
+ x <- d$x
+ }
+ else
+ {
+ # kvantilni rangi posameznih vrednosti s popravkom za zveznost:
+ # [0.5, N-0.5]/N
+ P <- (rank(x)-0.5)/N
+ }
+ #
+ if(length(n)==1) {
+ u <- runif(n, min(P),max(P) )
+ } else {
+ u <- n
+ }
+ #
+ xout <- approx(P,x,u)$y
+ return(xout)
+ }
```

Funkcija za kvantilni rang

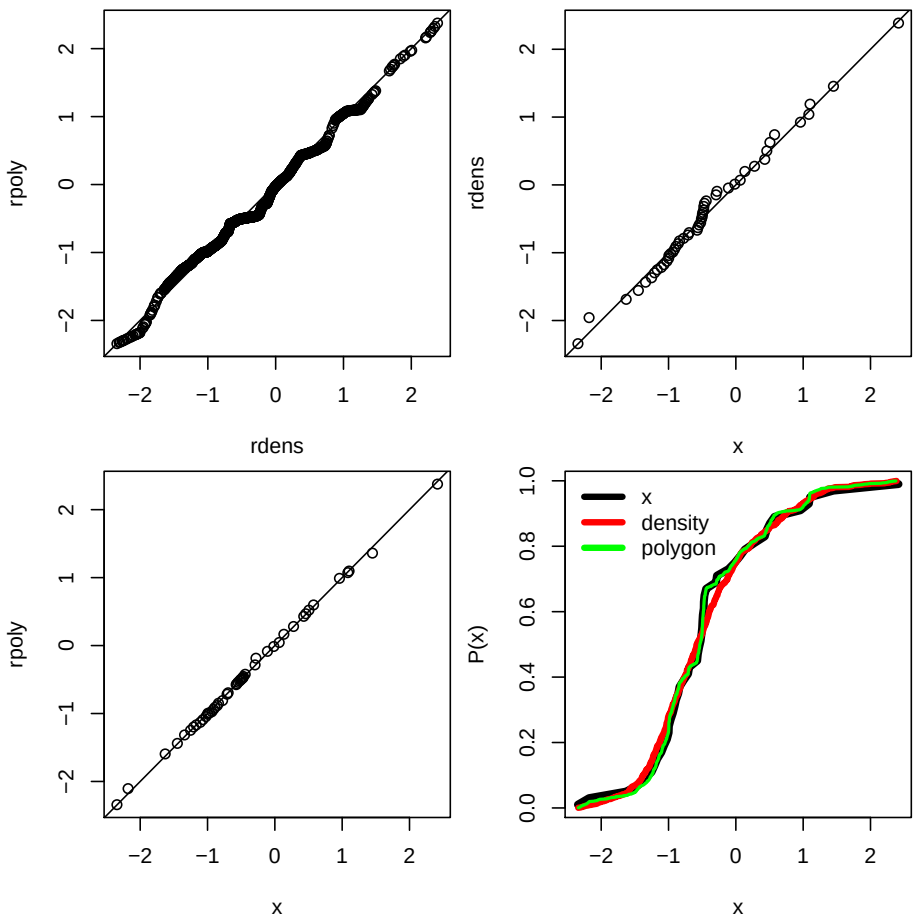
```
> P <- function(x) (rank(x)-0.5)/length(x)
```

```
> set.seed(1234)
```

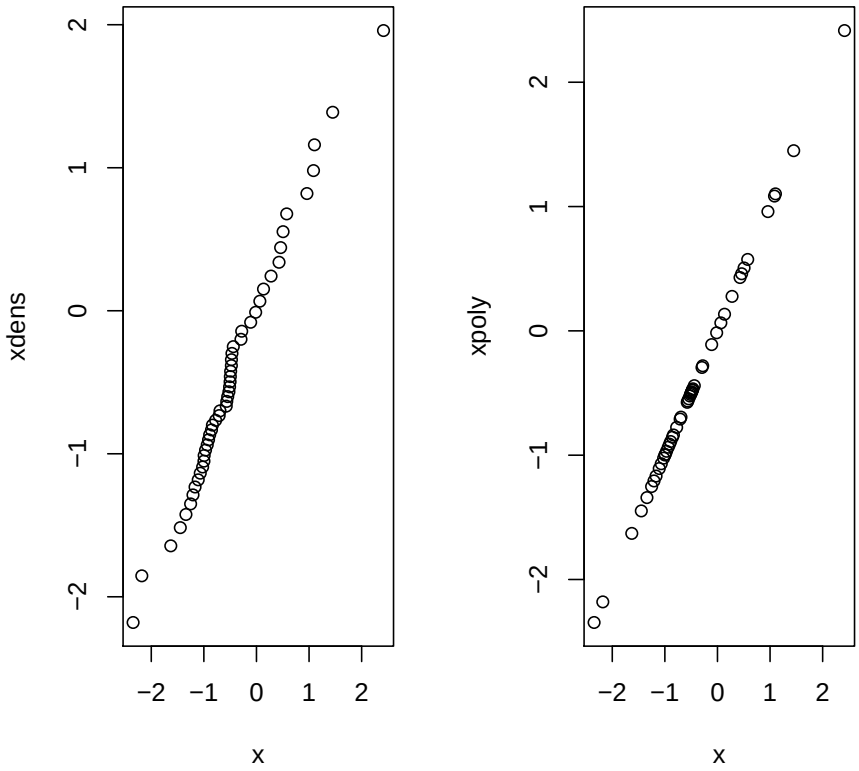
Primerjava generiranih števil z zvezno gostoto (`density=TRUE`) in s kumulativnim poligonom v točkh (`density=FALSE`)

```
> par(mfrow=c(2,2),mar=c(4,4,0.5,0.5))
> seed <- 670 #round(runif(1,1,1000))
> n <-1000
> x <- rnorm(50)
> set.seed(seed)
> rdens <- rcdf(n,x,density=TRUE)
> set.seed(seed)
> rpoly <- rcdf(n,x,density=FALSE)
> plot(rdens,rpoly)
> abline(c(0,1))
> qqplot(x,rdens)
> abline(c(0,1))
> qqplot(x,rpoly)
> abline(c(0,1))
> x <- sort(x)
> rdens <- sort(rdens)
> rpoly <- sort(rpoly)
> plot(x,P(x),type="l",lwd=5)
```

```
> lines(rdens,P(rdens),type="l",col="red",lwd=4)
> #lines(x,P(x),type="p",lwd=5)
> lines(rpoly,P(rpoly),type="l",col="green",lwd=2)
> legend("topleft",legend=c("x","density","polygon"),col=c("black","red","gree
+ lwd=4,bty="n")
```

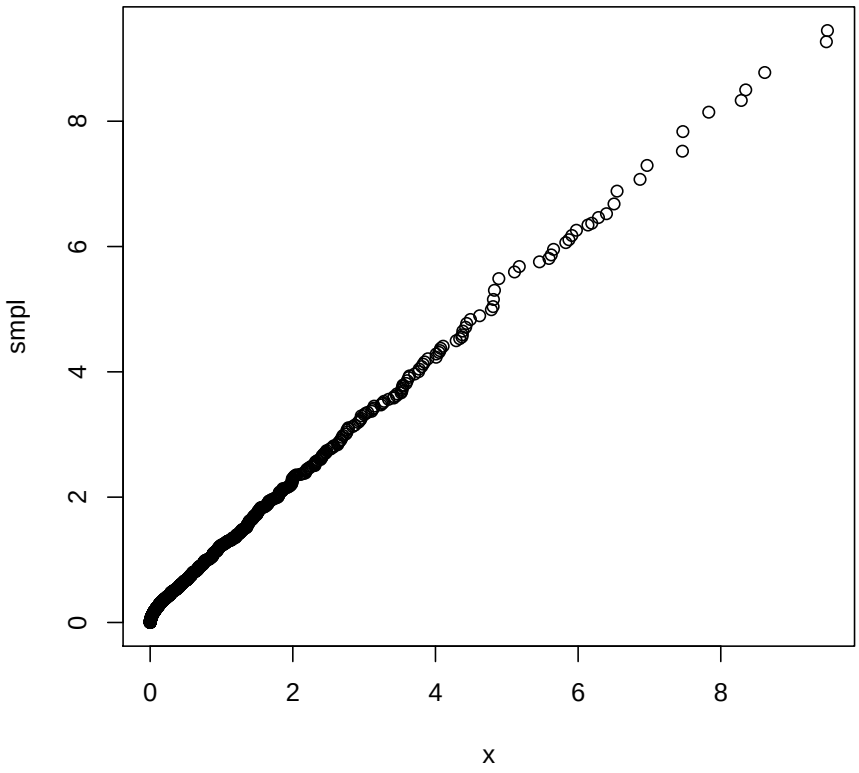



```
> par(mfrow=c(1,2))
> xdens <- rcdf(P(x),x,density=TRUE)
> plot(x,xdens)
> xpoly <- rcdf(P(x),x,density=FALSE)
> plot(x,xpoly)
>
```

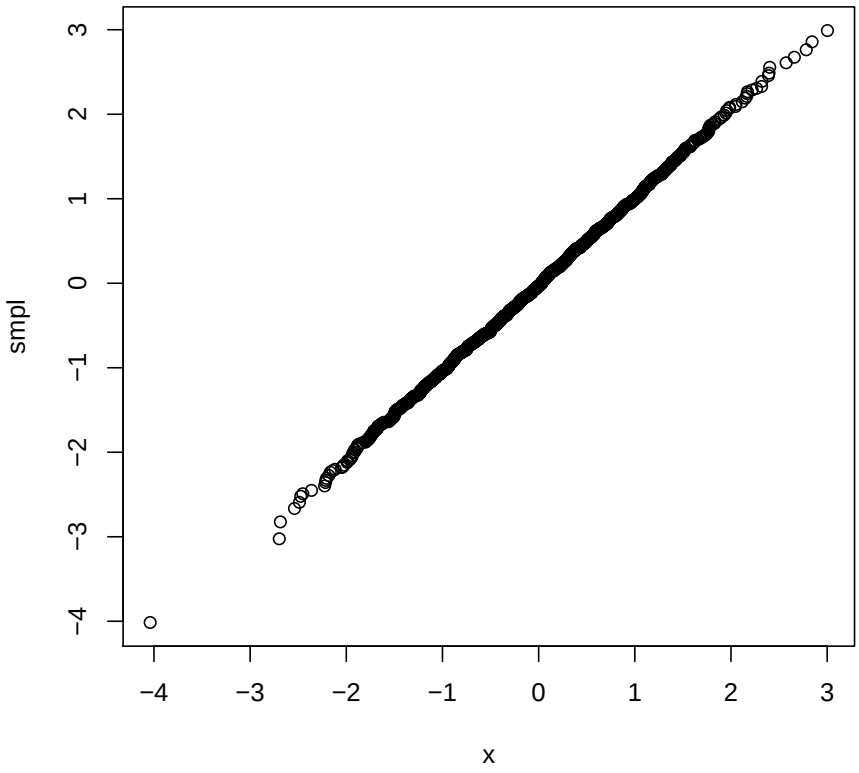


Uporaba empirične porazdelitvene funkcije (empirična kumulativna funkcija) rekonstruira vhodne podatke, uporaba gladke gostote pa ne.

```
> n <- 10000
> x <- rchisq(1000,1)
> smpl <- rcdf(n,x)
> qqplot(x,smpl)
```




```
> n <- 10000
> x <- rnorm(1000)
> smpl <- rcdf(n,x)
> qqplot(x,smpl)
```


smpl
x
−4
−3
−2
−1
0
1
2
3

SessionInfo

Windows 7 x64 (build 7601) Service Pack 1

- R version 2.15.1 (2012-06-22), `x86_64-pc-mingw32`
- Locale: `LC_COLLATE=Slovenian_Slovenia.1250`, `LC_CTYPE=Slovenian_Slovenia.1250`, `LC_MONETARY=Slovenian_Slovenia.1250`, `LC_NUMERIC=C`, `LC_TIME=Slovenian_Slovenia.1250`
- Base packages: base, datasets, graphics, grDevices, stats, utils
- Other packages: patchDVI 1.8.1584
- Loaded via a namespace (and not attached): tools 2.15.1

Project path: `D:/_Y/R/!KrNeki`

View as vignette

Project files can be viewed by pasting this code to R console:

```
> projectName <-"!KrNeki";  mainFile <-"HowTo-random-CDF"

> commandArgs()
> library(tkWidgets)
> # getrootpath <- function() {
> # fp <- (strsplit(getwd(), "/"))[[1]]
> # file <- file.path(paste(fp[-length(fp)], collapse = "/"))
> # return(file)
> # }
> # fileName <- function(name="bla",ext="PDF") paste(name,ext,sep=".")
> openPDF(file.path(dirname(getwd()),"doc",
+ paste(mainFile,"PDF",sep=".")))
> viewVignette("viewVignette", projectName, #
+ file.path("../doc",paste(mainFile,"RNW",sep=".")),font="arial 12")
>
```