# Plotting with plotpdf()

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The function `plotpdf()` plots a function, usually probability density (pdf) or cumulative distribution function (cdf), over an interval containing the "interesting" part of the function. The interval is based on quantiles computed from a supplied cdf or quantile function.

`plotpdf()` is most useful when the quantiles are not readily availaible but here are some examples with a normal distribution to illustrate the idea:

```
> pdf1 <- function(x) dnorm(x, mean = 100, sd = 5) # pdf
> qdf1 <- function(x) qnorm(x, mean = 100, sd = 5) # qf
> cdf1 <- function(x) pnorm(x, mean = 100, sd = 5) # cdf
```
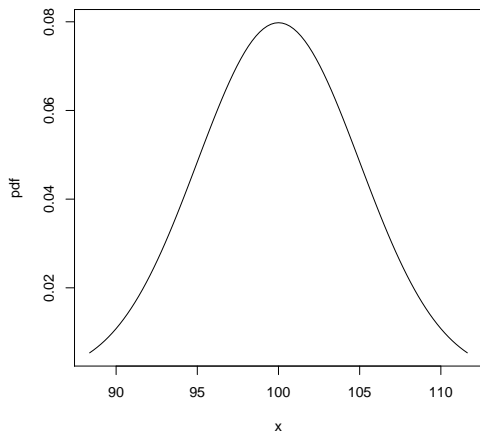
`plot(pdf1)` works but needs arguments 'from' and 'to' for a meaningful plot. We can simply pass the quantile function to `plotpdf()` to achieve this:

```
> plotpdf(pdf1, qdf1)
```
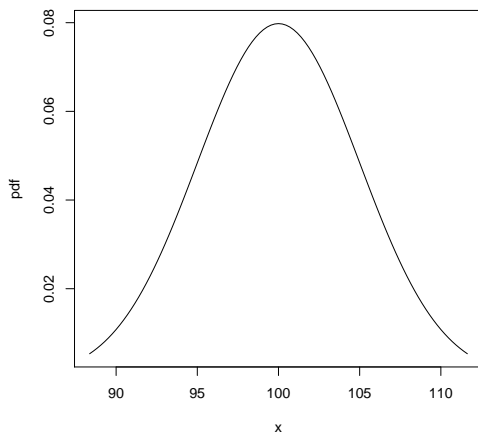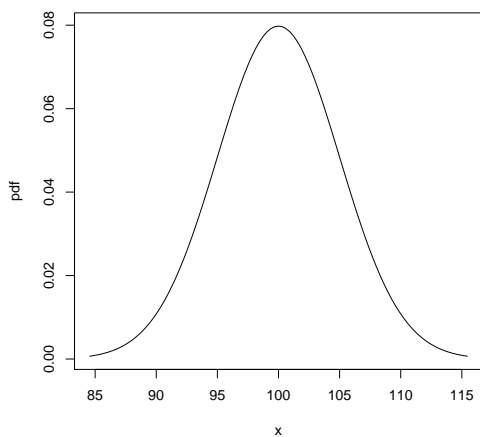

Similar result is obtained by supplying the cdf, which is handy when the quantiles are not easily available:
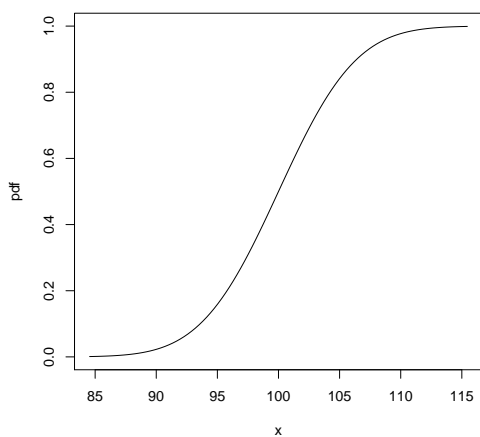
```
> plotpdf(pdf1, cdf = cdf1)
```

By default, the lower and upper 0.01 quantiles are used to set the limits on the x-axis. This can be changed with arguments `lq` and `uq`

```
> plotpdf(pdf1, cdf = cdf1, lq = 0.001, uq = 0.999)
```



```
> plotpdf(cdf1, cdf = cdf1, lq = 0.001, uq = 0.999) # plot a cdf
```


The pdf and cdf of a mixture distribution are usually straight-forward. Here is an example:

```
> pf1 <- function(x){
+     0.25 * pnorm(x, mean = 3, sd = 0.2) + 0.75 * pnorm(x, mean = -1, sd = 0.5)
+ }
> df1 <- function(x){
+     0.25 * dnorm(x, mean = 3, sd = 0.2) + 0.75 * dnorm(x, mean = -1, sd = 0.5)
+ }
```
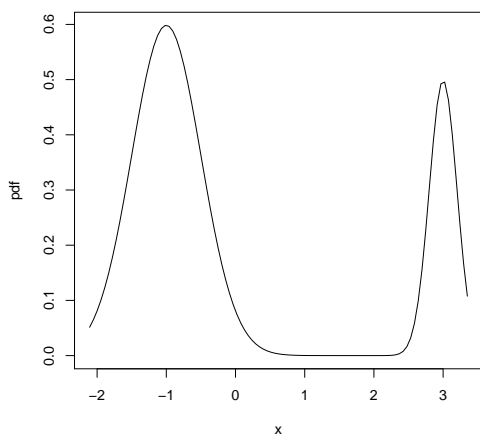
Here is a plot of the pdf:

```
> plotpdf(df1, cdf = pf1) # plot the pdf
```
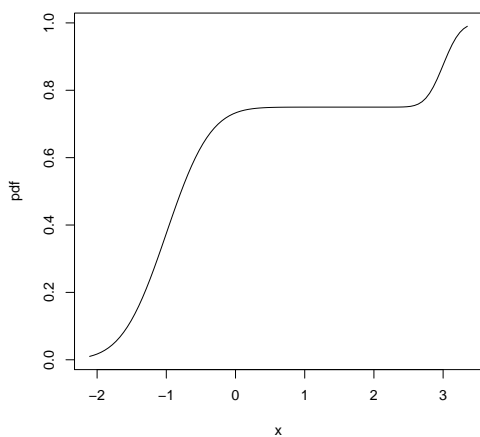

... and this produces the cdf:

```
> plotpdf(pf1, cdf = pf1) # plot the cdf
```
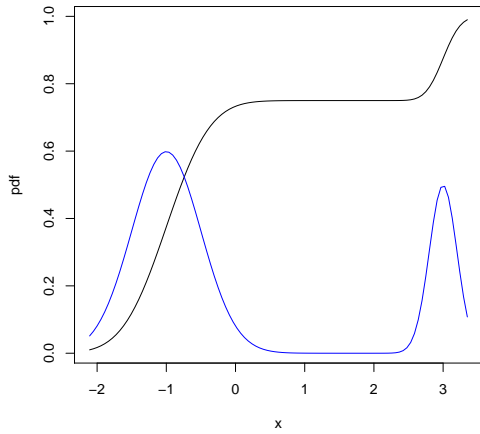

Additional arguments can be specified as for `plot()`:

```
> plotpdf(pf1, cdf = pf1)                       # plot the cdf
> plotpdf(df1, cdf = pf1, add = TRUE, col = "blue") # overlay the pdf
```

plotpdf() uses `cdf2quantile()` to compute quantiles from a cdf. `cdf2quantile()` can be used directly, as well:

```
> c(q5pc = cdf2quantile(0.05, pf1), q95pc = cdf2quantile(0.95, pf1))


     q5pc      q95pc
-1.750551   3.168325
```