

QQ plots

A quantile-quantile plot, or QQ plot, is a visual goodness-of-fit test. It checks if two distributions F (distribution we're testing against) and F_n (empirical distribution) are close. This is done by plotting F^{-1} on the x-axis against F_n^{-1} on the y-axis. If the points are close to the line $y=x$, the two distributions are close.

To plot a QQ plot:

1. Reorder the samples in increasing order. Denote the samples X_i such that X_i is the i th smallest sample.
2. Plot the points

$((F^{-1}(\frac{1}{n}), X_{(1)}), (F^{-1}(\frac{2}{n}), X_{(2)}), \dots, (F^{-1}(\frac{i}{n}), X_{(i)}), \dots, (F^{-1}(\frac{n-1}{n}), X_{(n-1)}))$

$(F^{-1}(\frac{n}{n}), X_{(n)})$ is skipped because for a Gaussian cdf F , $F^{-1}(1) = \infty$. If $F^{-1}(1)$ is defined, the point can be included.)

To plot a QQ plot in MATLAB, use the `qqplot` command.

```
pd = makedist(distname, Name1, Value1, Name2, Value2, ...)  
qqplot(x, pd)
```

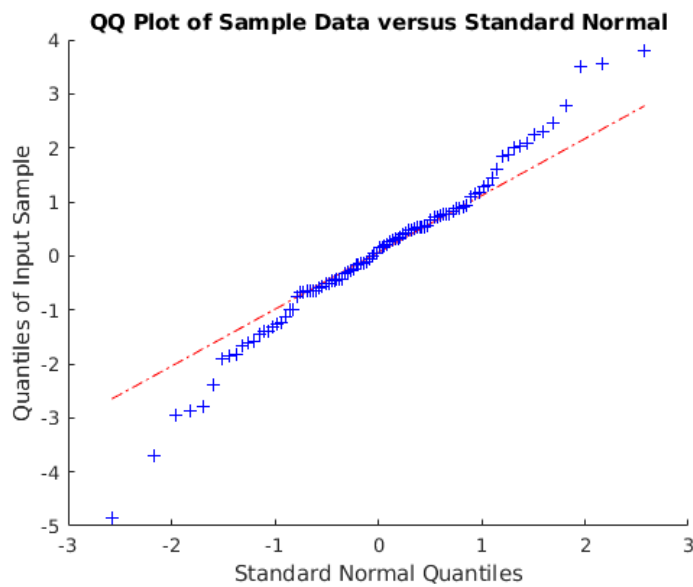
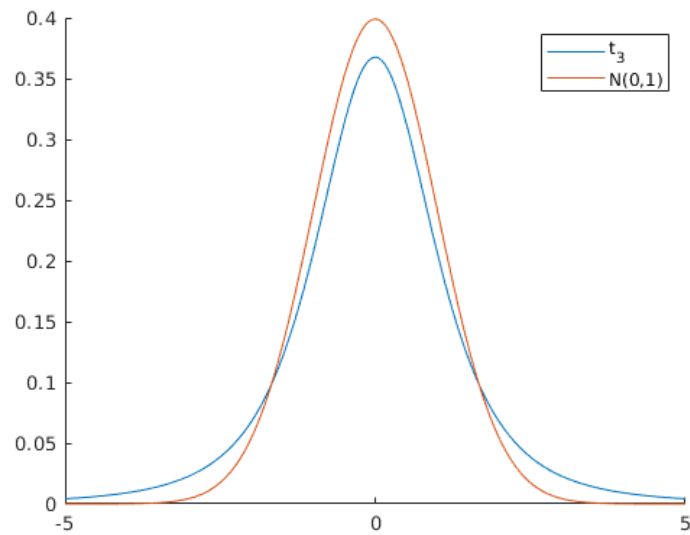
distname can be any family of distributions, including Normal, Gamma, Binomial, Beta, Uniform, Poisson, etc. Parameters of the distribution can be specified with the name/value pairs. See the [MATLAB help page for makedist](#) for more details.

x is the array of sample data.

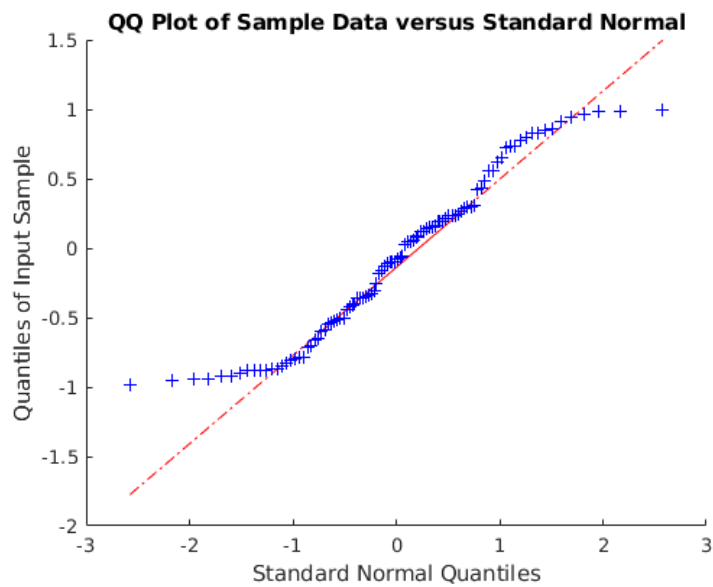
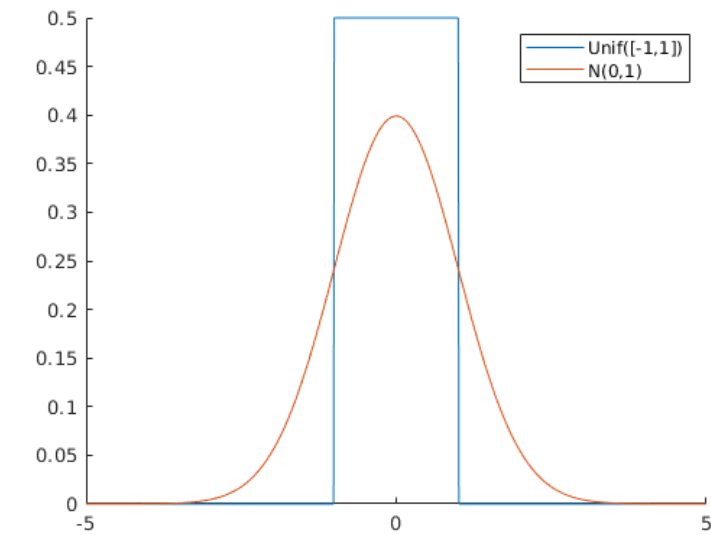
Patterns of QQ plots

There are four recognizable patterns in QQ plots that gives information about the distribution of the sample. These plots were generated with [this MATLAB code](#).

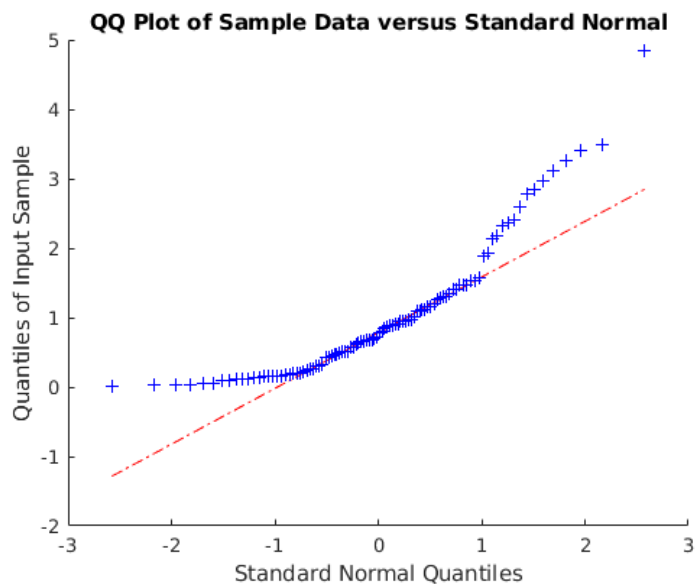
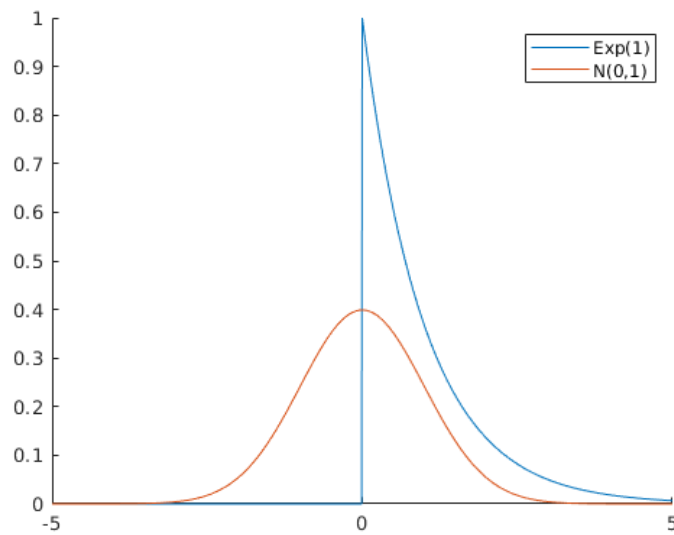
Heavy/fat tails



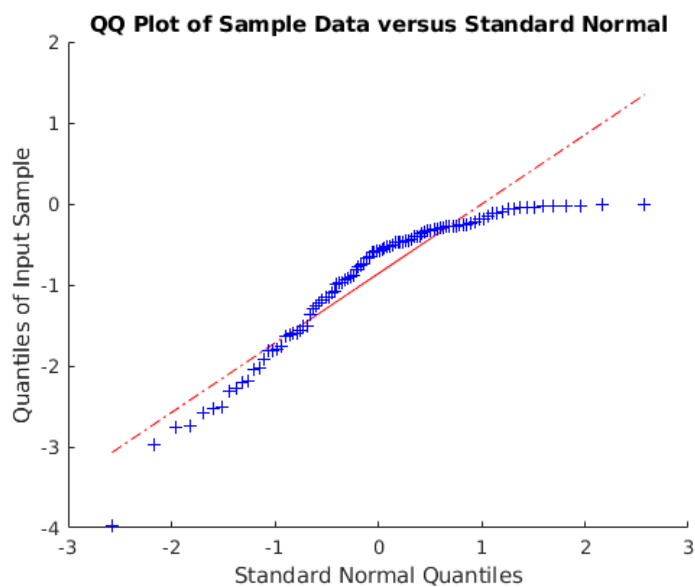
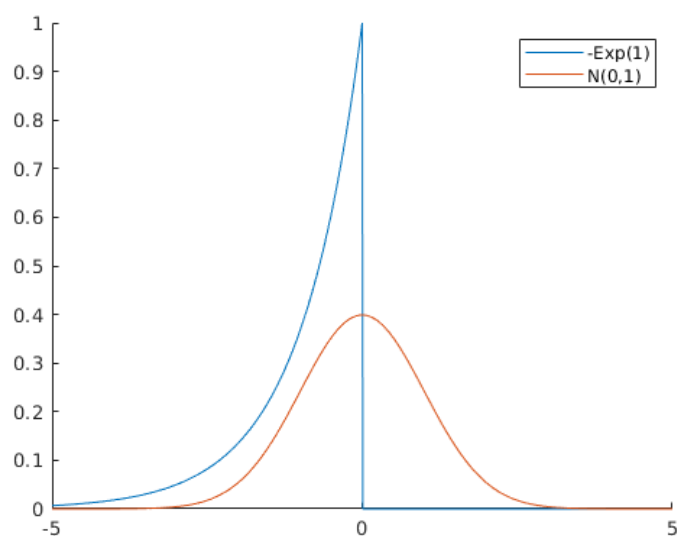
Light/skinny tails



Right skewed



Left skewed



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