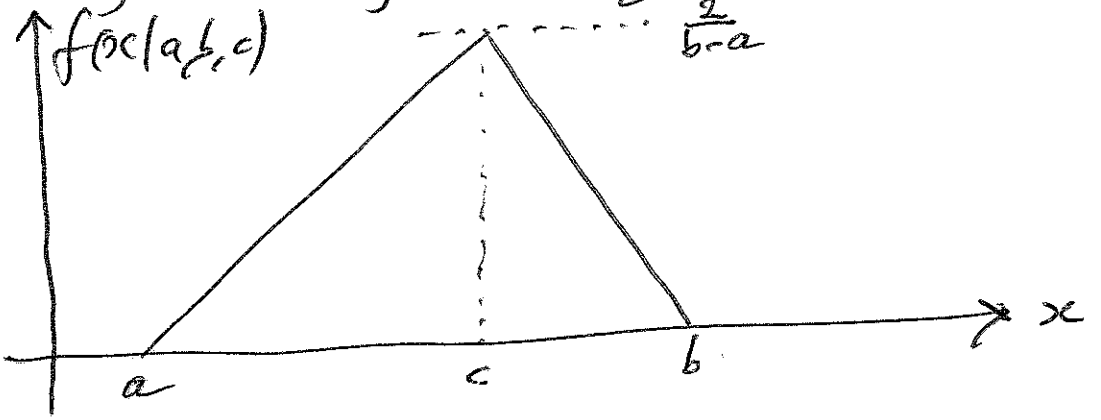
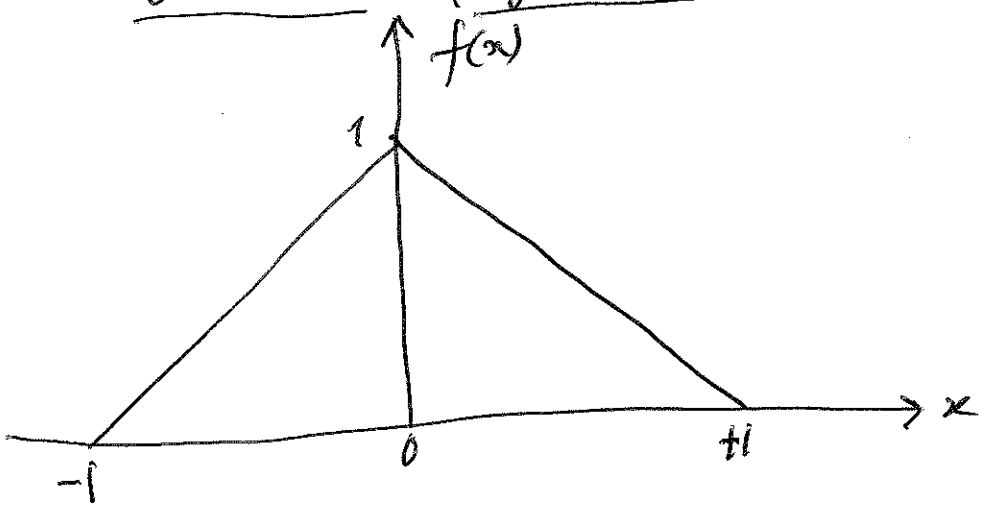
Extra assignment Week 1

In exercise 1 of "exercises Week 1" you met the triangular distribution. On Wikipedia you will find out that this is the name of a three-parameter family of distributions with probability density looking like this:



In this assignment we focus on the symmetric case, $c = \frac{1}{2}(a+b)$, and even more in particular the case $a=-1$, $b=+1$, $c=0$ which I'll call the standard (symmetrical) triangular distribution.



(A) (theoretical). Derive the cumulative distribution function F of the standard triangular distribution, and the quantile function Q.

(B) Write R functions to generate a random sample of size n from the standard Δ distribution

(i) using the trick that the sum of two independent uniforms has a triangular distribution

(ii) using the inverse transform method

(iii) using the acceptance-rejection method. (*)

Use the function system.time() to compare the computational efficiency of these methods.

(*) cf. Rizzo Example 3.7