**This part of the assignment is due by the 8/12.**

**In general always write your name and date of creation as comments in the files and try to be “user friendly” when you write the code:**

* **Add comments on the code to remember yourself and the other what the code does**
* **Manage the possible errors in the input given by the user**
* **You should have three files (main.cxx, cauchy.h and cauchy.cxx)**

Define a class that includes the cauchy function and members to calculate the integral of the function and sample random points on it, to do this proceed through the following steps:

* 1. Define the function, with a constructor that takes as argument the xmin and xmax of the range where the function is defined and a string. These 3 things should initialize private members of the class.
  2. Define a private method that is the cauchy function: f(x)=
  3. Define a public member function of the class that evaluates the integral of the function, on the range stored as private members. The integral can be calculated as I= R\*() where xi are random points extracted from the range and R is the length of the range. The integral should be 0.874 if you use -5,5 as extremes of the range.   
     Pay attention to the number of points being used to evaluate the integral.
  4. Add a member function that sample random numbers from the Cauchy distribution. To sample random number from a not-uniform distribution you can use the [Metropolis](https://stephens999.github.io/fiveMinuteStats/MH_intro.html) algorithm.
     1. Generate a random number (x) on the range where the function is defined, sampled from a uniform function. This will be the first number you generated (x1=x)
     2. Iterative:
        1. Generate a random number y between xmin and xmax
        2. Compute A=, where f is the function and xt is the previous number extracted
        3. Generate a random number u, between 0 and 1
        4. Accept y, if u < A
        5. If you accepted y xt+1= y otherwise xt+1=xt
        6. Write xt+1 on a file, called as the string that you passed as argument to the constructor
  5. BONUS – Take these generated numbers in a program of your choosing (Excel, Google Sheets, etc), create a histogram of the values and include a pdf of this plot. The data generated should reflect the probability distribution of the function.