Exercise 1

The goal of this exercise is to compute the Differential Entropy of a continuous random variable.
The Graphical Interface takes the parameters and checks if b>a.
The function differential_entropy compute the integral between a and b of the pdf.
The function is then divided by the result of the previous integral (normalization factor).

To compute the differential entropy and the gaussian bound I used the following definitions.

$$h(X) \triangleq - \int f_X(x) \log_2 f_X(x) dx$$

$$\mathrm{Var}(X) = \int_{\mathbb{R}} x^2 f(x)\, dx - \mu^2,$$

$$h(X) \leq h(X_G) = \frac{1}{2} \log_2(2\pi e\, \sigma_X^2)$$