1. The following functions can be used to approximate the delta function. Plot the following window functions using Python.

   (a) Rectangular Pulse:

$$x_1(t) = \begin{cases} \frac{1}{T}, & -\frac{T}{2} < t < \frac{T}{2} \\ 0, & \text{elsewhere} \end{cases} \quad -\infty < t < \infty \quad \lim_{T \to 0} x_1(t) = \delta(t) \tag{1}$$

   (b) Exponential Pulse:

$$x_2(t) = \frac{1}{2\tau} \exp^{-\frac{|t|}{\tau}} \quad -\infty < t < \infty \quad \lim_{\tau \to 0} x_2(t) = \delta(t) \tag{2}$$

   (c) Gaussian Pulse:

$$x_3(t) = \frac{1}{\sigma\sqrt{2\pi}} \exp^{-\frac{t^2}{2\sigma^2}} \quad -\infty < t < \infty \quad \lim_{\sigma \to 0} x_3(t) = \delta(t) \tag{3}$$

   (d) Sinc Pulse:

$$x_4(t) = \frac{\sin\left(\frac{\pi t}{T}\right)}{\frac{\pi t}{T}} \quad -\infty < t < \infty \quad \lim_{T \to 0} x_4(t) = \delta(t) \tag{4}$$

   In your report, please also include the Python source codes and plots for each window function. You may try various values approaching zero to observe the converging behaviour of these functions.