

Convolution

0) Convolution formula $f_z(a) = \int_{-\infty}^{\infty} f_x(x) f_y(a-x) dx$

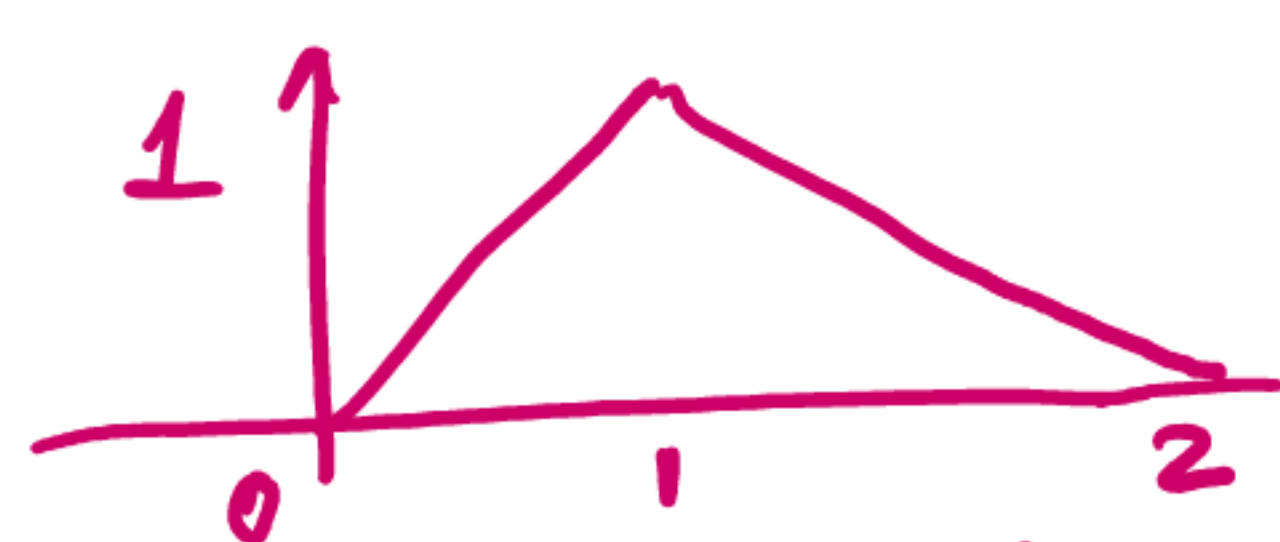
1) Draw $f(x)$ & $g(a-x)$ as a function of x

2) $W = X + Y + Z$, we need $f_w(a)$

f_x, f_y, f_z have uniform distribution

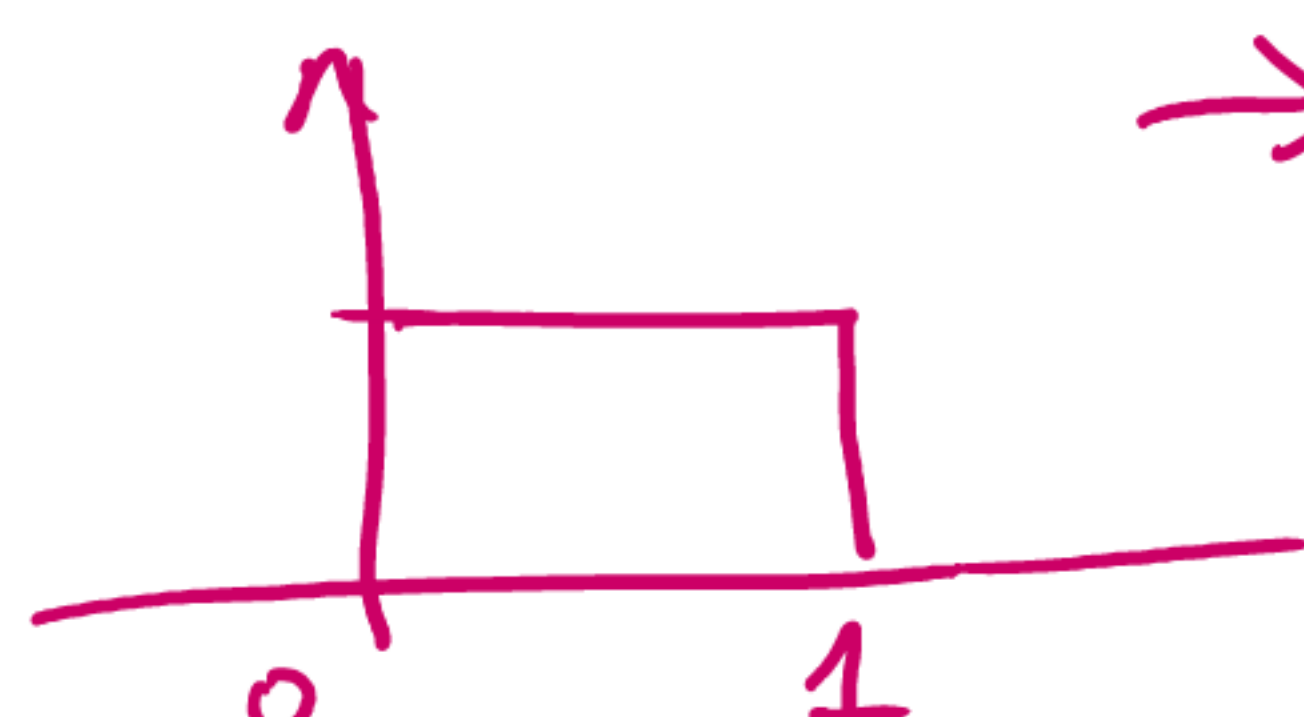
in class we had done sum of two & it has this

p.d.f



→ we will denote this by f_1

we need to convolve this with

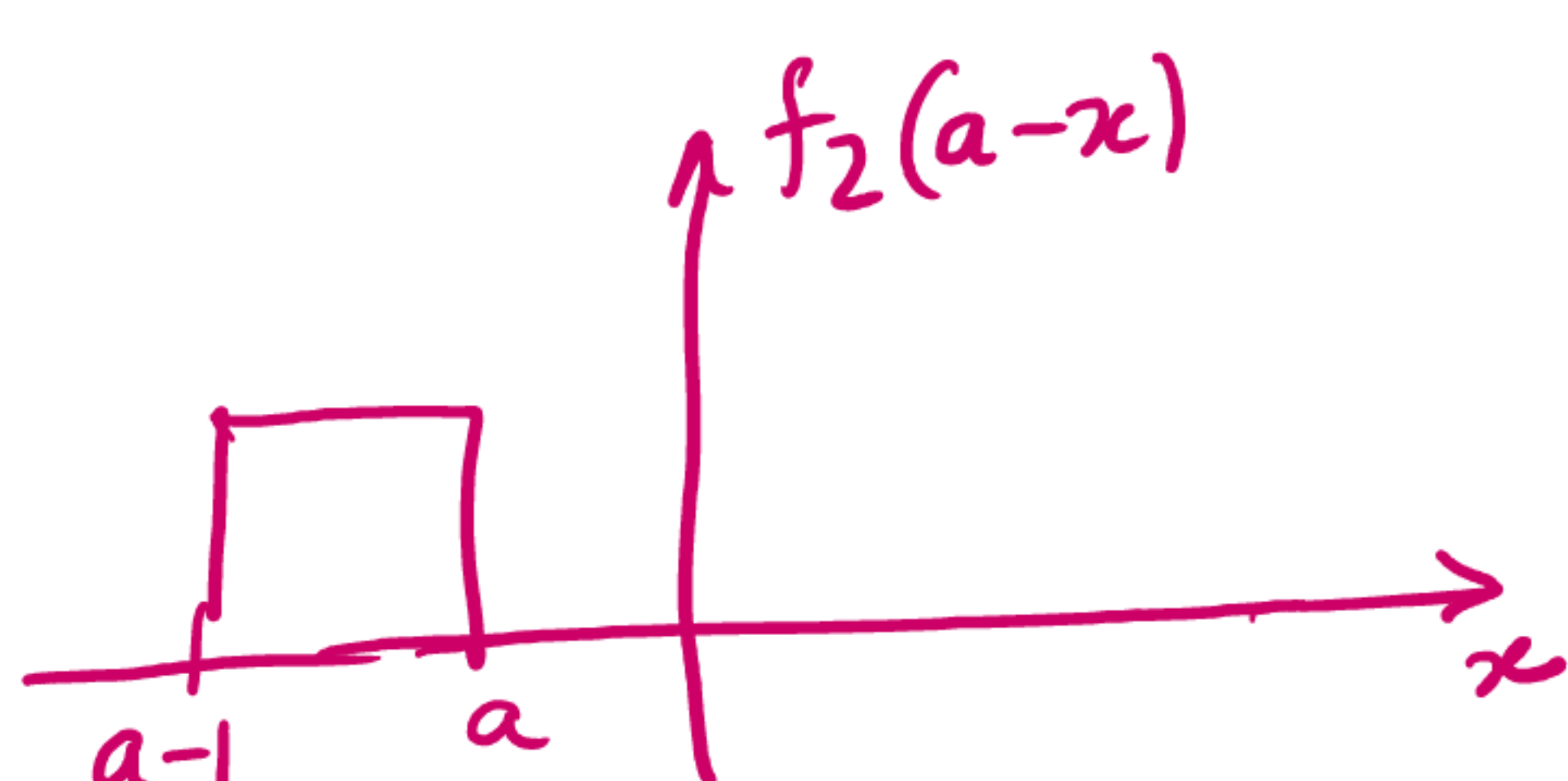


→ we will denote this by f_2

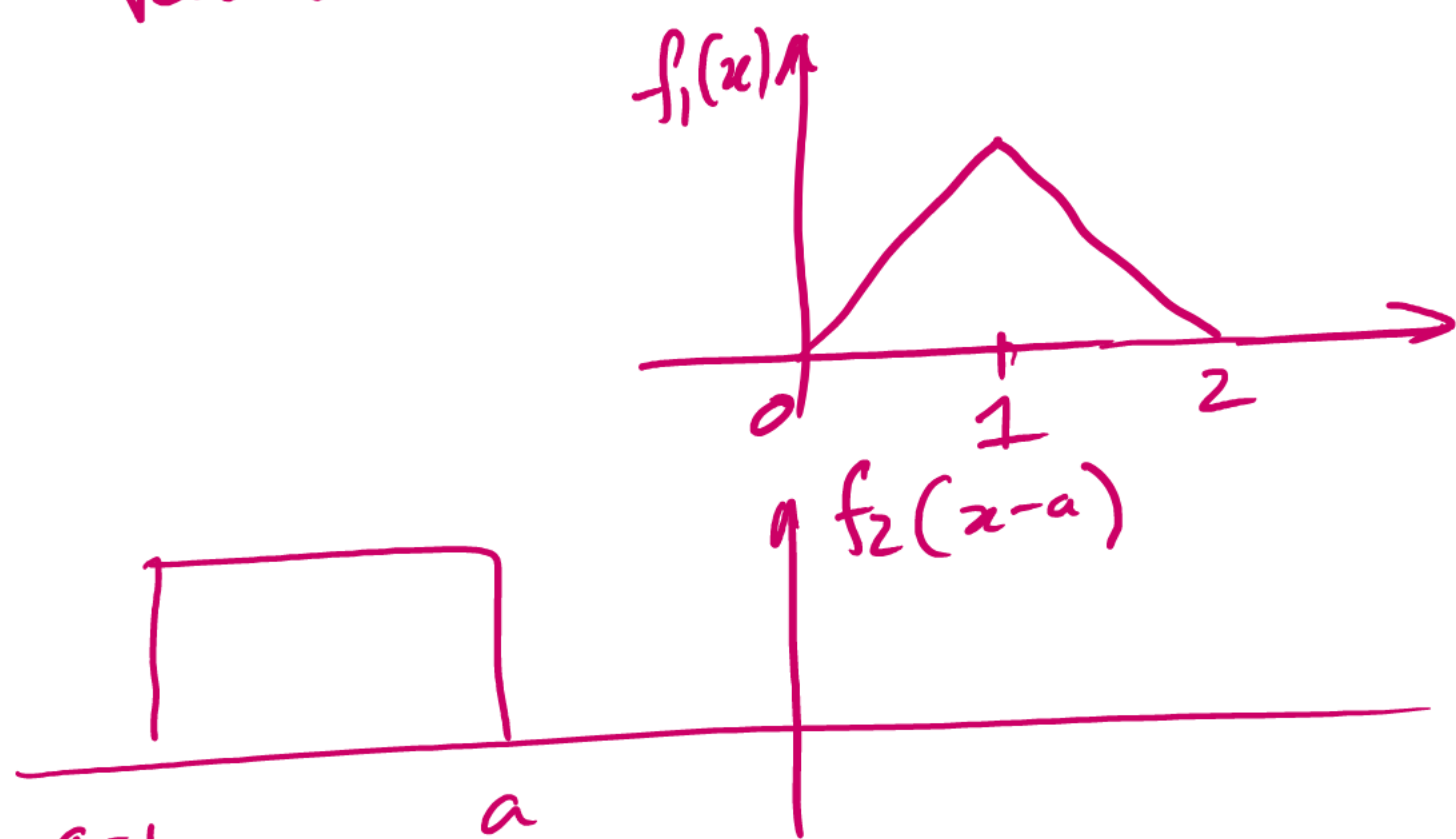
Recall

$$f_1(x) = \begin{cases} x & 0 \leq x \leq 1 \\ 2-x & 1 \leq x \leq 2 \\ 0 & \text{otherwise} \end{cases}$$

$$f_2(x) = \begin{cases} 1 & 0 \leq x \leq 1 \\ 0 & \text{otherwise} \end{cases}$$

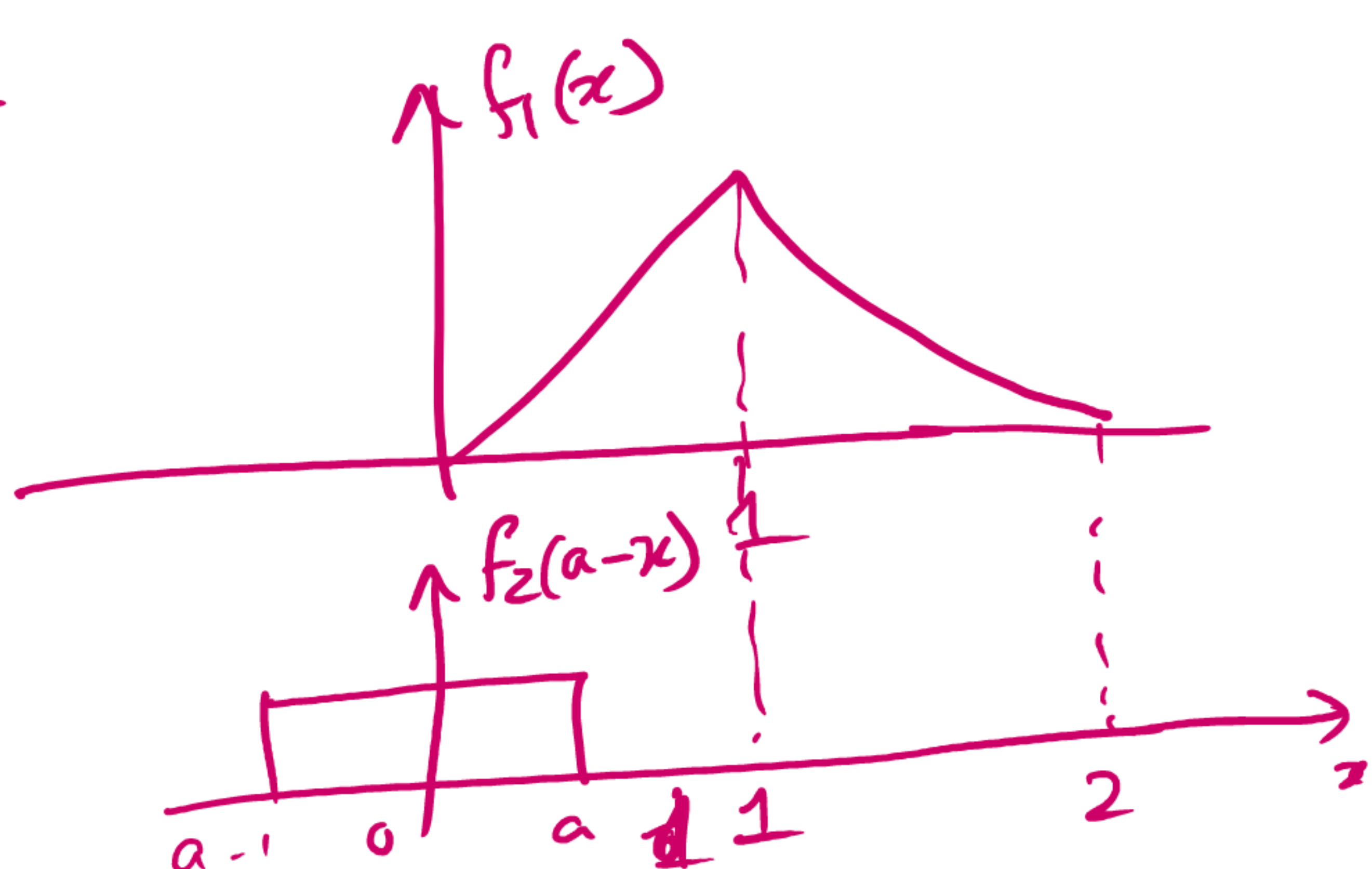


In the next step we need to overlap f_1 & f_2 for various values of a

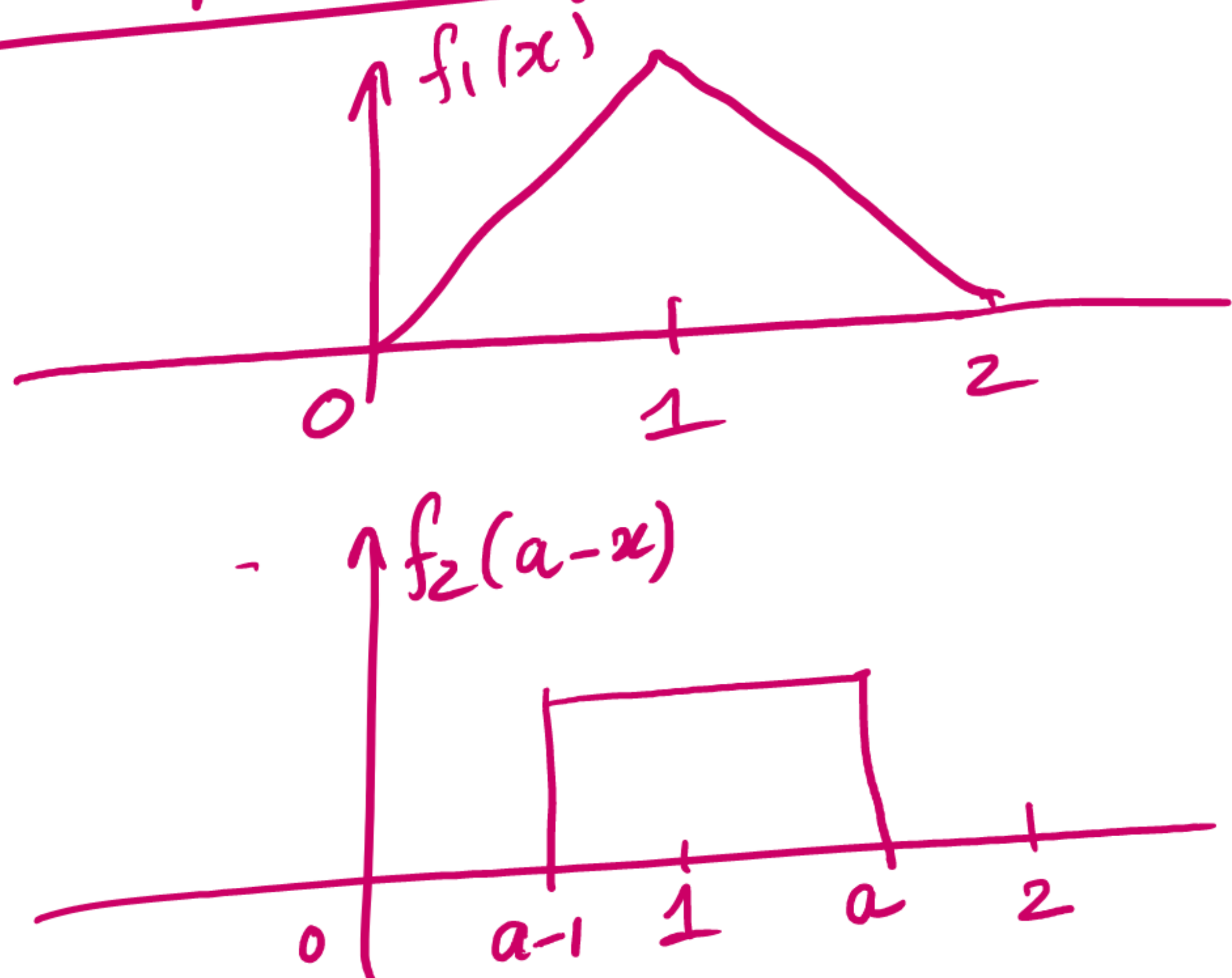


No overlap when $a < 0$

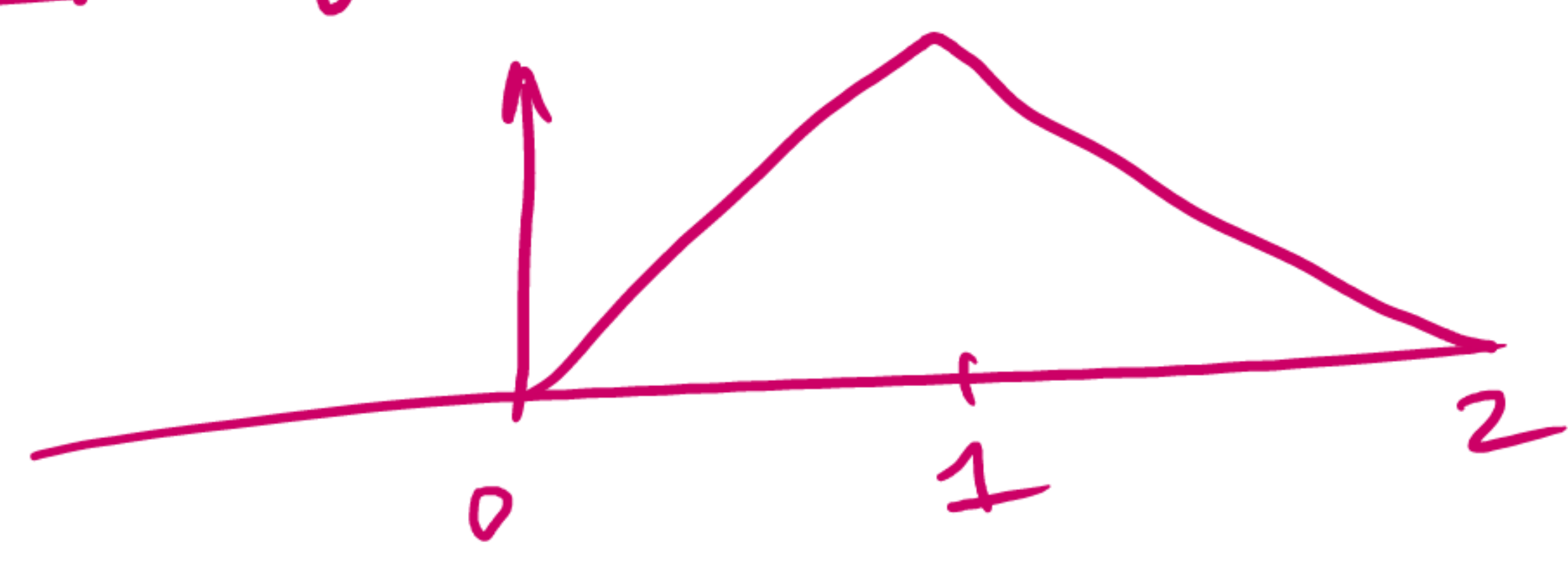
Overlap of type 1



Overlap of type 2



Overlap of type 3



Overlap of type 4

