Generative Adversarial Networks (GANs)

$z \longrightarrow$ Generator G $\longrightarrow G(z)$ fake example $\longrightarrow$ Discriminator D $\longrightarrow$ real or fake
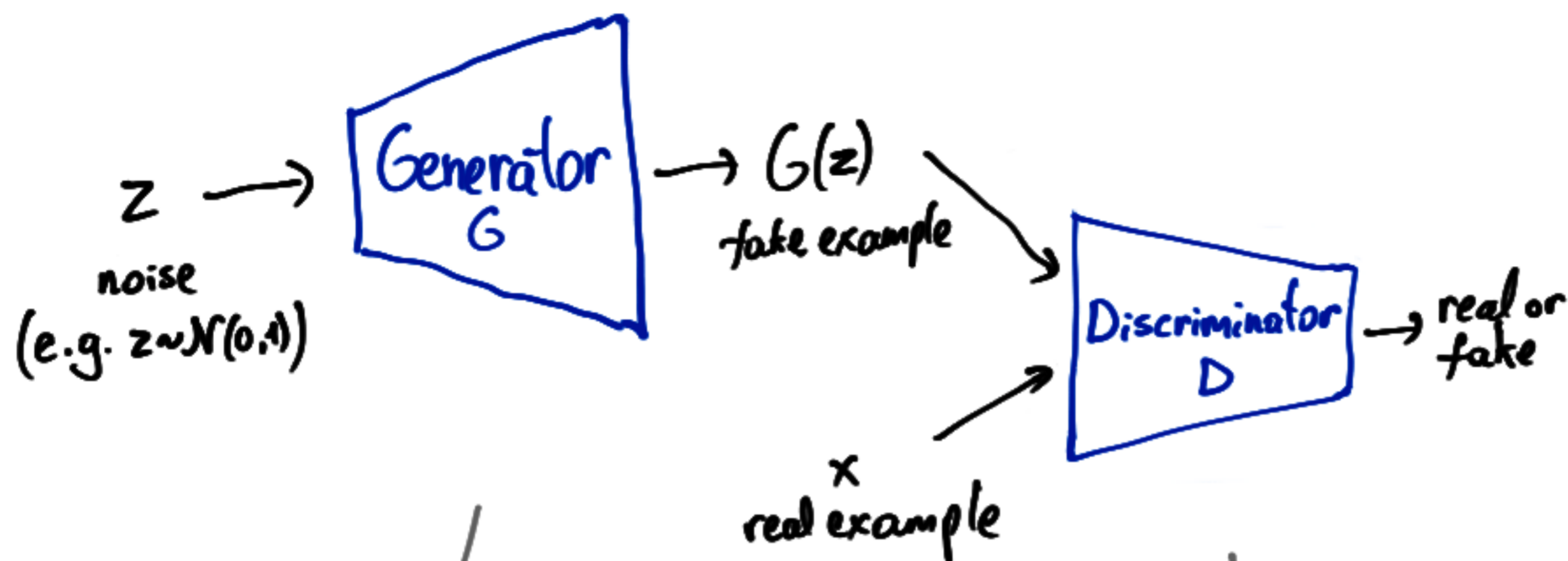
noise (e.g. $z \sim \mathcal{N}(0,1)$)

x real example

Tries to generate images such that the discriminator thinks it's real, i.e.:

$(G(z), 1)$

$$\min_{G} \ -\log D(G(z))$$

$$\mathcal{L}_G = \mathcal{L}_{BCE}(D(G(z)), 1)$$

Tries to classify between real & fake, i.e. dataset generated in the following way:

$(G(z), 0)$ $\Rightarrow$ just binary classification
$(\ x\ , 1)$

$$\min_{D} \ -y \log D(x) - (1-y) \log(1 - D(x))$$

$$\mathcal{L}_D = \mathcal{L}_{BCE}(D(x), y)$$