

Lab 9

V.a. repartizate normal - $N(m, \sigma^2)$

$$X \sim N(m, \sigma^2)$$

$$f(x) = \frac{1}{\sqrt{2\pi}\sigma} e^{-\frac{(x-m)^2}{2\sigma^2}}; \forall x \in \mathbb{R}$$

$$F(x) = \int_{-\infty}^x f(t) dt$$

$$\Phi: \mathbb{R} \rightarrow \mathbb{R}, \Phi(x) = \int_{-\infty}^x \frac{1}{\sqrt{2\pi}} e^{-\frac{t^2}{2}} dt$$

Sch var $y = \frac{t-m}{\sigma}$

Procedeu de standardizare al v.a. $N(m, \sigma^2)$

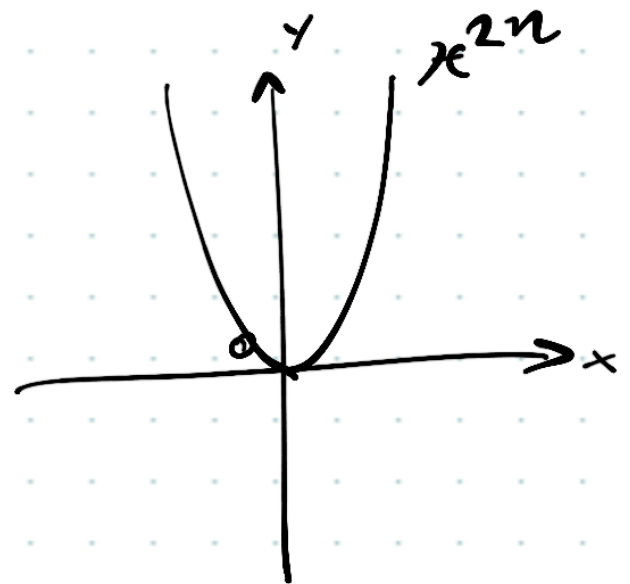
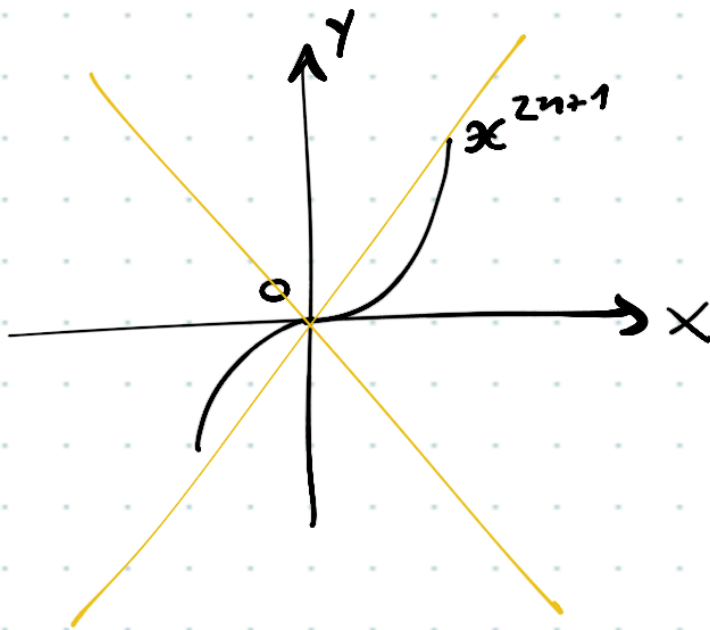
$$Z = \frac{X-m}{\sigma} \sim N(0, 1)$$

$$E(Z) = E\left(\frac{X-m}{\sigma}\right) = \frac{1}{\sigma} E(X-m) = \frac{E(X)-m}{\sigma} = 0$$

$$\begin{aligned}\text{Var}(Z) &= \text{Var}\left(\frac{x-m}{\sigma}\right) = \frac{1}{\sigma^2} \text{Var}(x-m) = \\ &= \frac{\text{Var}(x)}{\sigma^2} = \frac{\sigma^2}{\sigma^2} = 1\end{aligned}$$

$$f \text{ par} \Leftrightarrow \forall x \in D \quad f(-x) = f(x)$$

$$f \text{ impar} \Leftrightarrow \forall x \in D \quad f(-x) = -f(x)$$



$$\Phi(-x) = 1 - \Phi(x)$$

Exc

1. $X \sim N(270, 100)$

$$P((X \leq 240) \cup (X \geq 290)) = P(X \leq 240) + P(X \geq 290)$$

$$P(X \leq 240) = P\left(\frac{X - 270}{10} \leq -3\right) = \Phi(-3) = 0,0044$$

\parallel
 $F(240) \quad Z \sim N(0, 1)$

$$P(X \geq 290) = 1 - P(X \leq 290) = 1 - \Phi(2) = 0,0540$$

$$P((X \leq 240) \cup (X \geq 290)) = 0,0584$$