

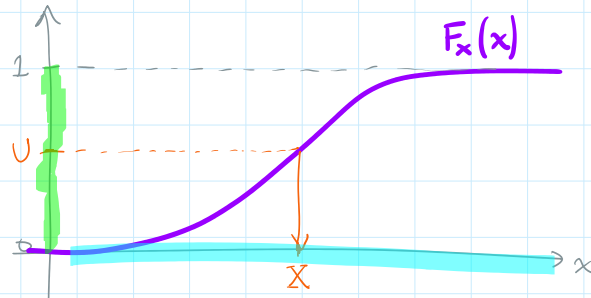
To simulate values of continuous random variable X with pdf $f_X(x)$:

Find the cdf $F_X(x)$.

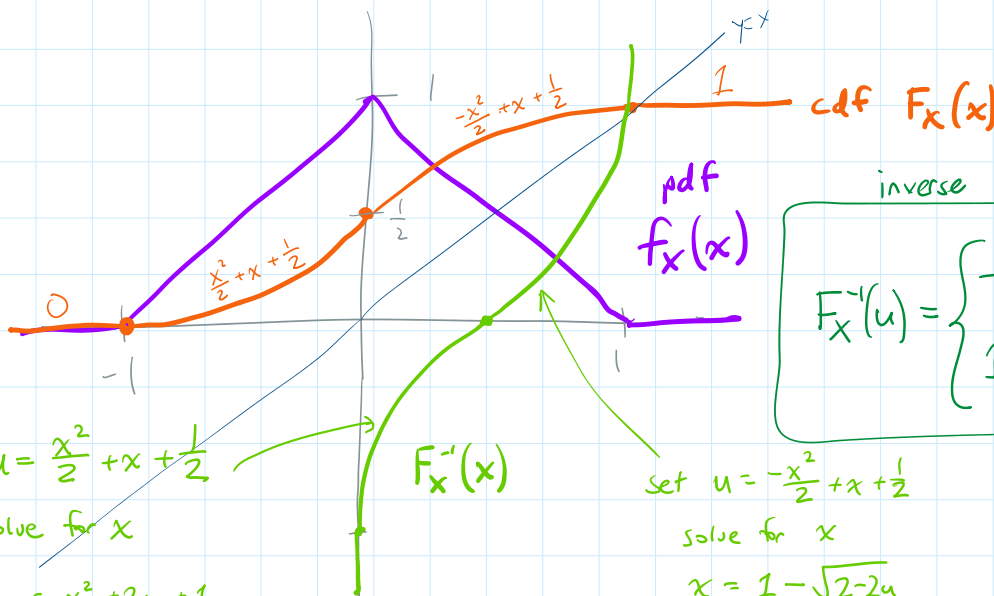
Generate a uniform value from $[0, 1]$:

$$U \sim \text{Unif}[0, 1]$$

Take $X = F_X^{-1}(U)$



① pdf $f_X(x) = \begin{cases} x+1 & \text{if } -1 \leq x \leq 0 \\ 1-x & \text{if } 0 < x \leq 1 \\ 0 & \text{otherwise} \end{cases}$



inverse cdf

$$F_X^{-1}(u) = \begin{cases} -1 + \sqrt{2u} & \text{if } 0 \leq u < \frac{1}{2} \\ 1 - \sqrt{2-2u} & \text{if } \frac{1}{2} \leq u \leq 1 \end{cases}$$

set $u = \frac{x^2}{2} + x + \frac{1}{2}$
 solve for x
 $2u = x^2 + 2x + 1$

$$0 = 1x^2 + 2x + 1 - 2u$$

$$x = \frac{-2 \pm \sqrt{2^2 - 4(1-2u)}}{2} = -1 + \sqrt{2u} \quad \text{if } 0 \leq u \leq \frac{1}{2}$$

set $u = -\frac{x^2}{2} + x + \frac{1}{2}$
 solve for x
 $x = 1 - \sqrt{2-2u}$