$p(X = 3{,}140{,}725)$

1 Bernoulli trial

$p = \pi/4$

$N = 4{,}000{,}000$

$$1 = [p + (1-p)][p + (1-p)]$$
$$= p^2 + 2p(1-p) + (1-p)^2$$

Here, k = number of successes each with probability, p.

$k = 0$
$= 1$
$= 2$

Binomial

$$p(X = k) = \binom{N}{k} p^k (1-p)^{N-k}$$

$$\binom{N}{k} = \frac{N!}{k!(N-k)!}$$

$$V(X) = Np(1-p) = \sigma^2$$

$$\sigma = \sqrt{Np(1-p)} = 821$$

- rejection or hit+miss method.
- transformation method.

$x \in \mathbb{R}$

pdf = probability density function
cdf = cumulative distribution fn.

pdf is normalized to 1.
ie.

$$\int_{-\infty}^{\infty} f(x)\,dx = 1$$

$$F(x) = P\{X \leq x\} = \int_{-\infty}^{x} f(x)\,dx$$

cdf

pdf

$$f(x) = \frac{dF}{dx} \geq 0$$

$$x \sim Un(0,1) \qquad y = \underline{S}(x) \qquad y \sim f_y(y) = \rho_y(y)$$

$$\rho_x(x)\,dx = \rho_y(y)\,dy$$

$$x = \int_0^x dx = \int_{y_0}^{y} \rho_y(y)\,dy = F(y) \qquad (1)$$

$$y = F^{-1}(x) \qquad (2)$$

$$p(t;\tau) = \frac{1}{\tau} e^{-t/\tau}$$

$$\left[\int_0^\infty p(t;\tau)\,dt = 1 \right]$$
$t \in \mathbb{R}^+$

$$F(t) = \int_0^t \text{"} = 1 - e^{-t/\tau}$$

$x \sim Un(0,1)$

$$x = F(t) = 1 - e^{-t/\tau}$$

$$e^{-t/\tau} = 1 - x$$

$$-t/\tau = \ln(1-x)$$

$$\boxed{t = -\tau \ln(1-x)}$$

$$\left(t = -\tau \ln(x) \right)$$

given that $(1-x) \sim Un(0,1)$ too.