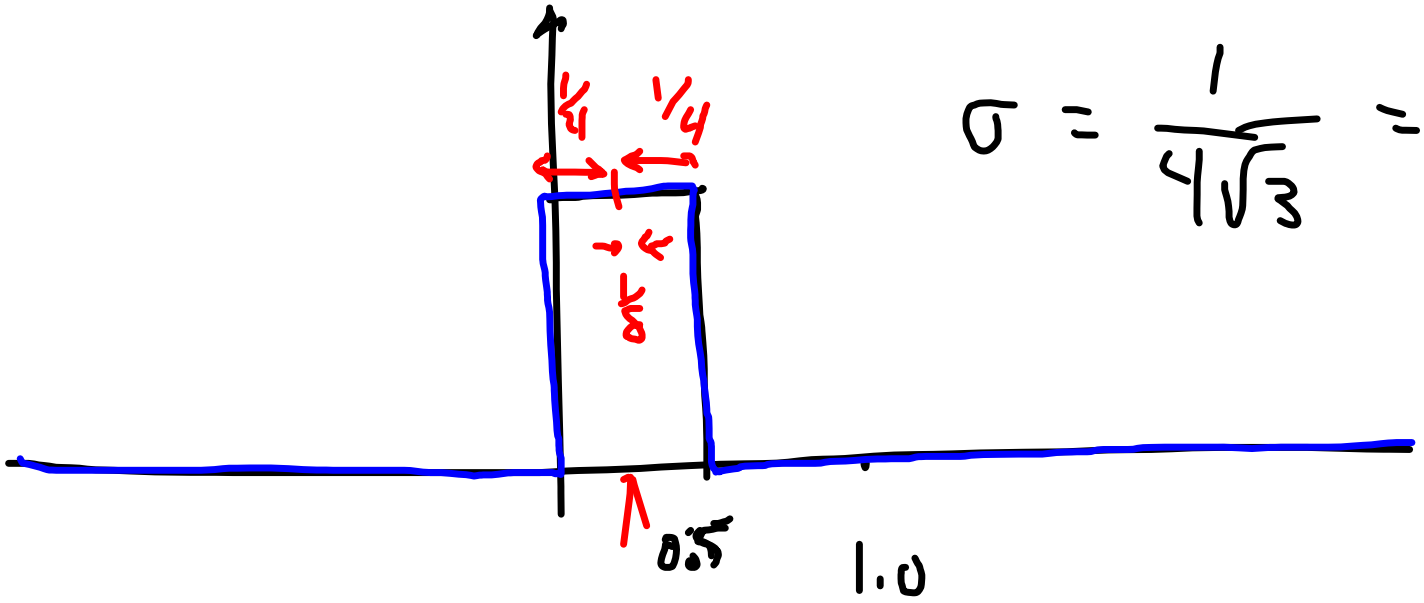
Diagnostic Answers:



$$\sigma = \frac{1}{4\sqrt{3}} = \frac{1}{\sqrt{48}}$$

$$E(X^2) = \frac{1}{12}$$

The two-deck experiment.

Prob (both cards are the same)

= Prob (AH♦AH or KH♦KH or ... or 2♣x2♣)

= Prob(AH♦AH) + Prob(KH♦KH) +

Possibilities

$= 0$

Dave	Chris
AH	AH
AH	KH
⋮	

$\leftarrow 52$ possibilities

P(AH for D and AH for Chris)

= P(AH for Dave) · P(AH for Chris)

because they're independent.

General Rule

P(#1 and #2) =

P(#1) · P(#2, given #1 occurred)

P(A ∩ B) = P(A) P(B|A)

↑ conditional probability.

Bayes' Thm

"

P(B ∩ A) = P(B) P(A|B)

P(B|A) = P(A|B) P(B) / P(A)

Independence

$$P(A|B) = P(A)$$

Statisticians

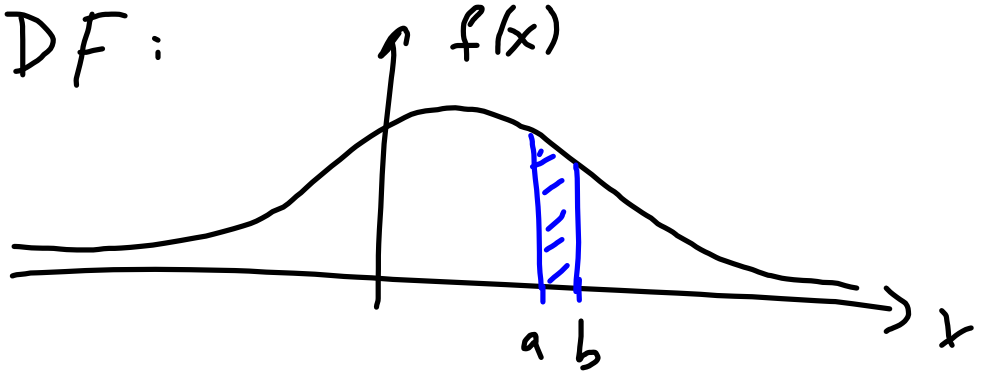
$$P(A \text{ and } B) = P(A)\,P(B)$$

Answer to the 2-deck question is

$$\frac{1}{52}\cdot\frac{1}{52} + \frac{1}{52}\cdot\frac{1}{52} + \cdots \text{ (52 copies)}$$

$$= 52\left[\frac{1}{52}\cdot\frac{1}{52}\right] = \frac{1}{52}.$$

PDF:

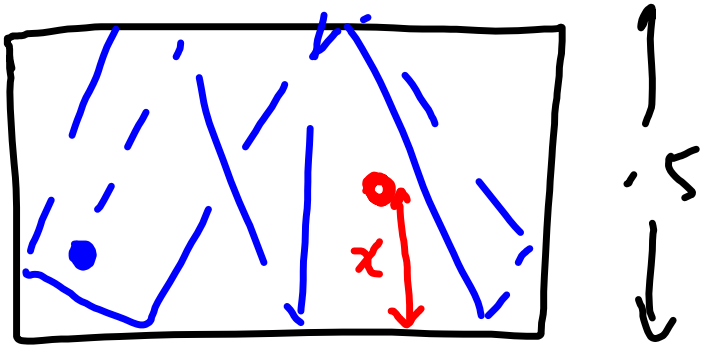


$$\text{Prob}(a < x < b) = \int_a^b f(x)\, dx$$

"x" is a mathematical variable.

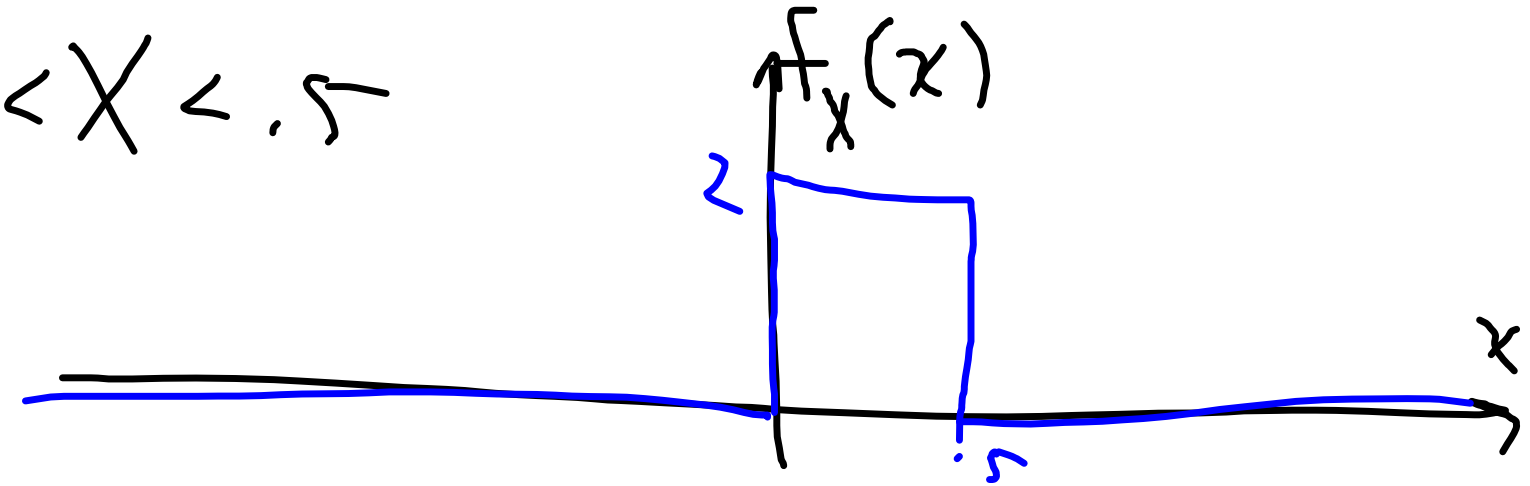
X is the random variable.

$$P(x < X < x+\delta x) = \int_x^{x+\delta x} f(x)\, dx$$



X = distance from lower edge.

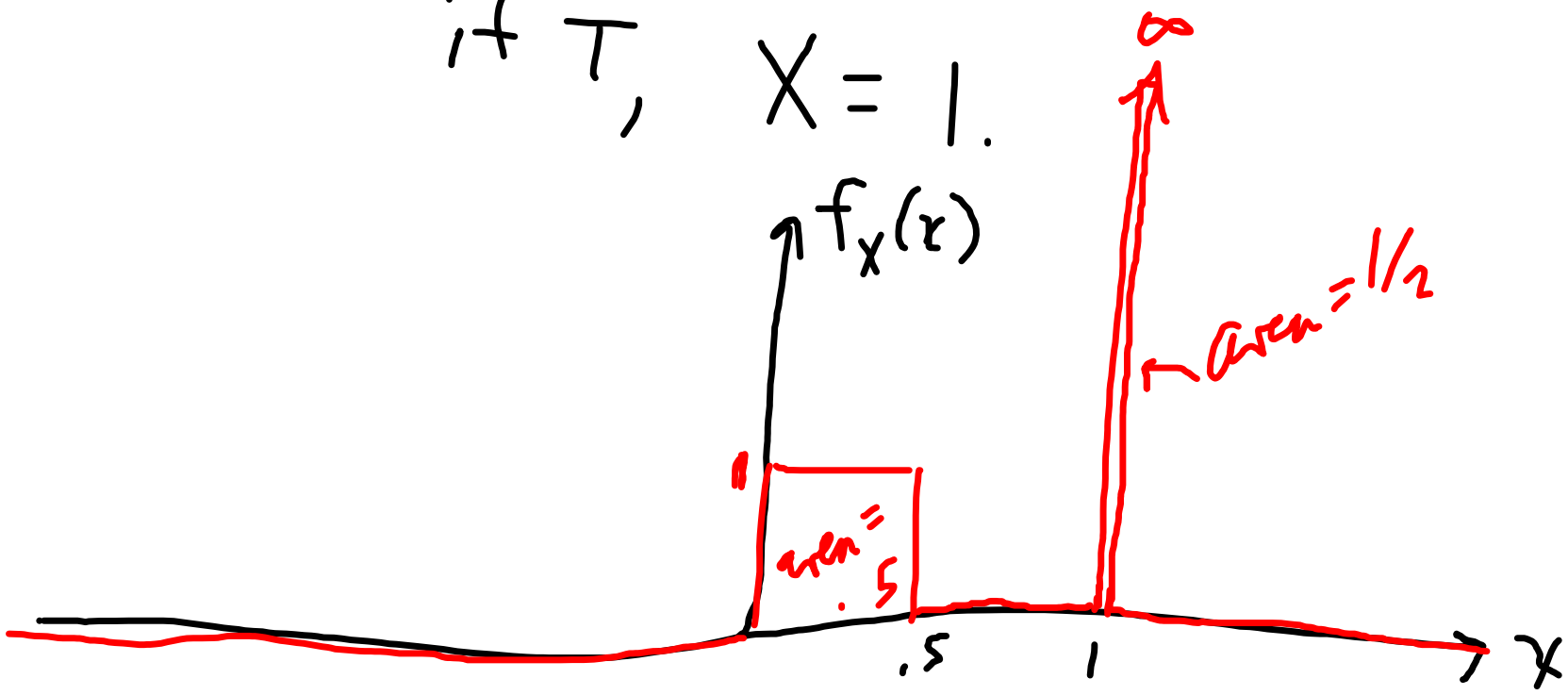
$0 < X < .5$



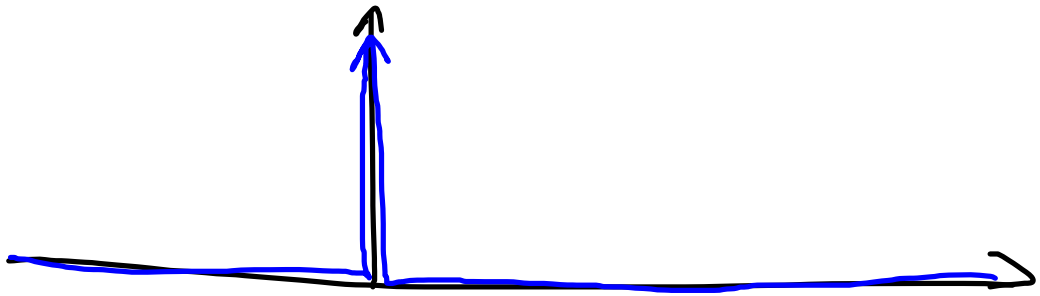
Experiment. Flip a coin:

if H, roll ball on billiard table: X = location

if T, X = 1.

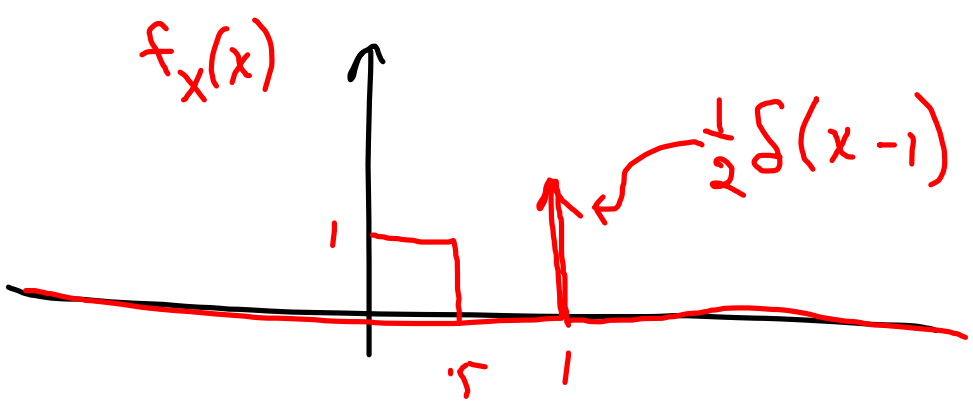


"Delta function"



$\delta(x) = 0$ if $x \neq 0$

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



Roll a die

If odd #, $X = -1$

If 2 or 4, $X = 1$

If 6,