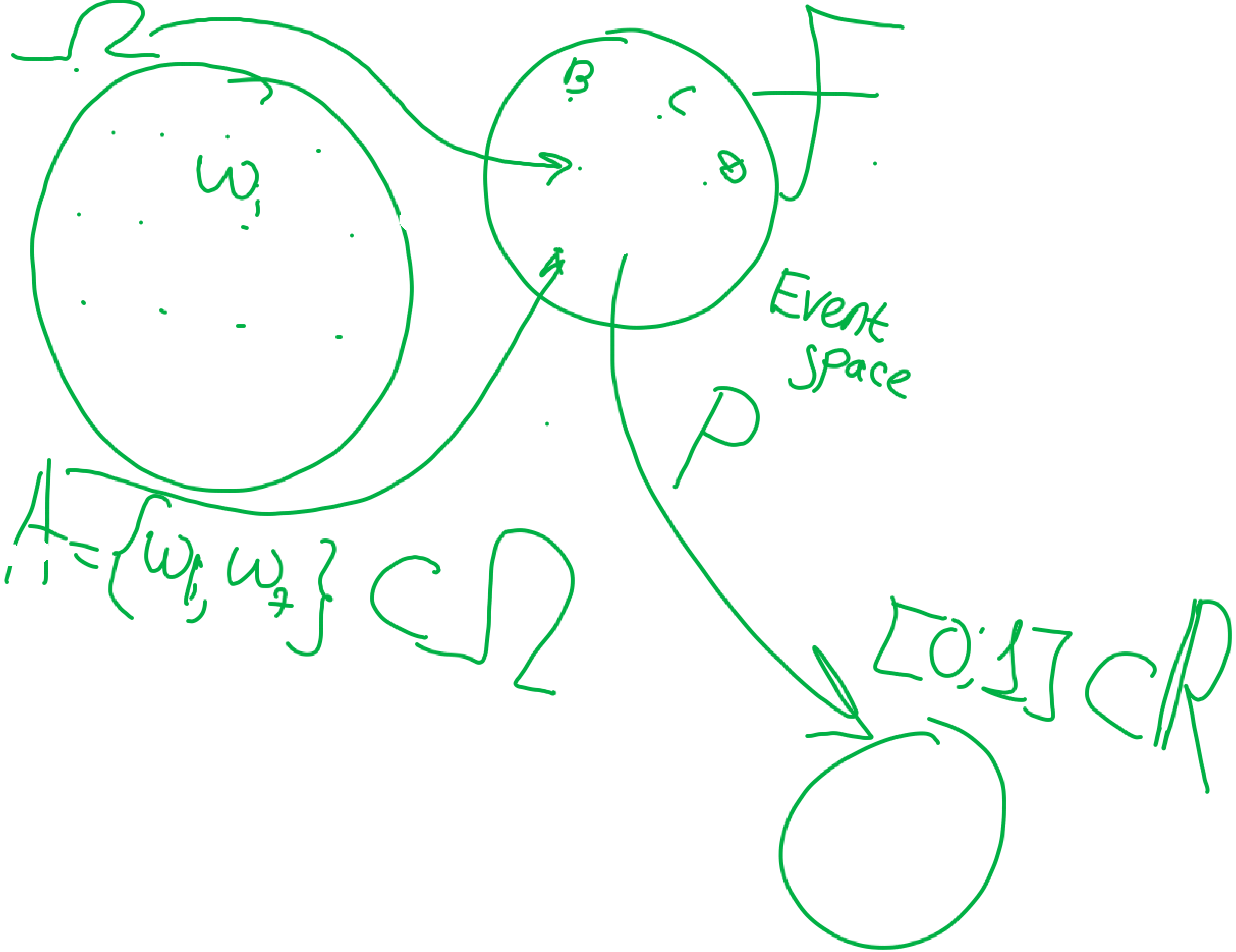
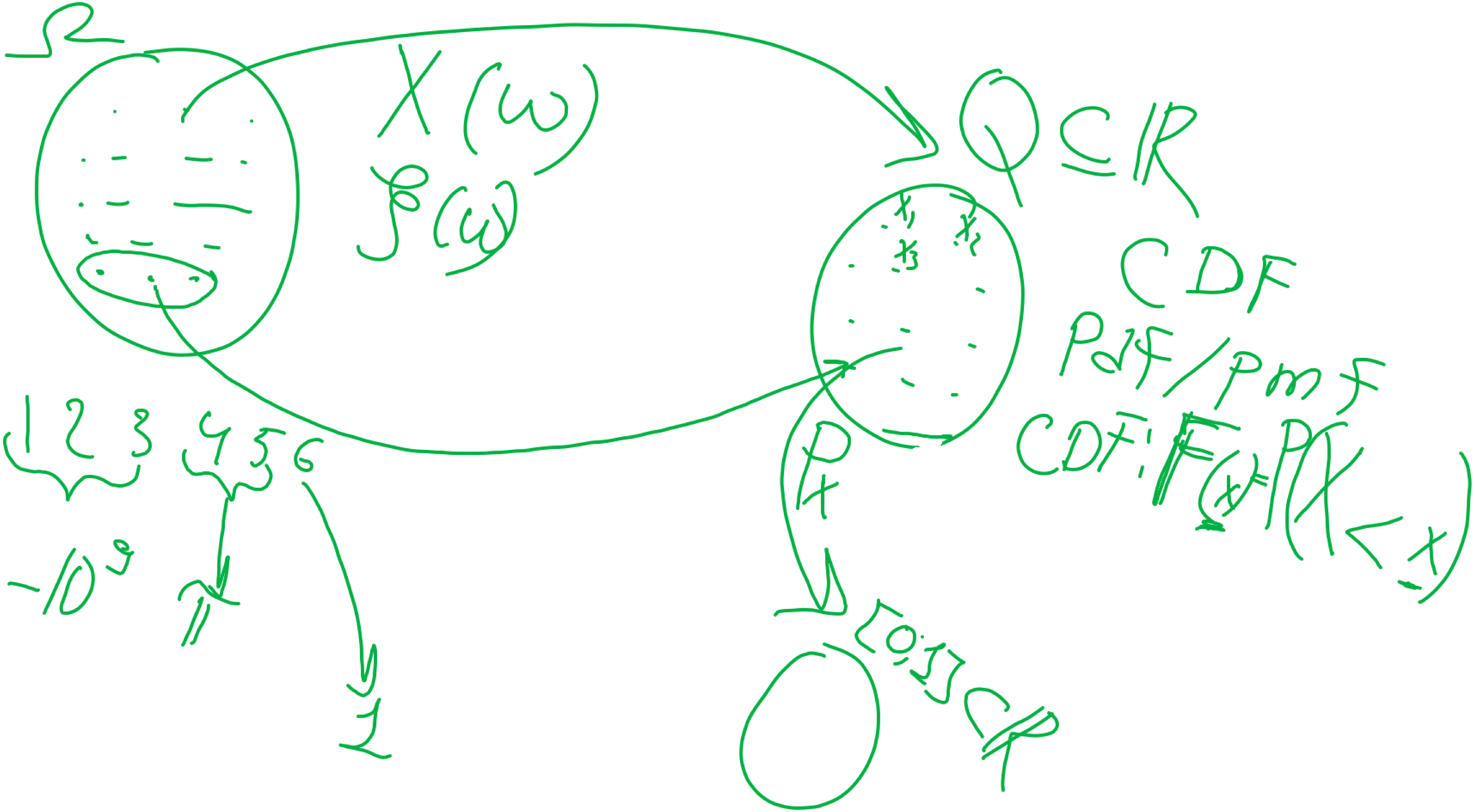


Ω
ω₁
B
C
D
A
F
Event space
P
A = {ω₁, ω₇} ⊂ Ω
[0,1] ⊂ R



Ω
X(ω)
ρ(ω)
Ω ⊆ ℝ
x₁ x₂ x₃
CDF
pdf/pmf
CDF: F(x) = P(X < x)
P_X
[0,1] ⊆ ℝ
1 2 3 4 5 6
-10^9
π
1

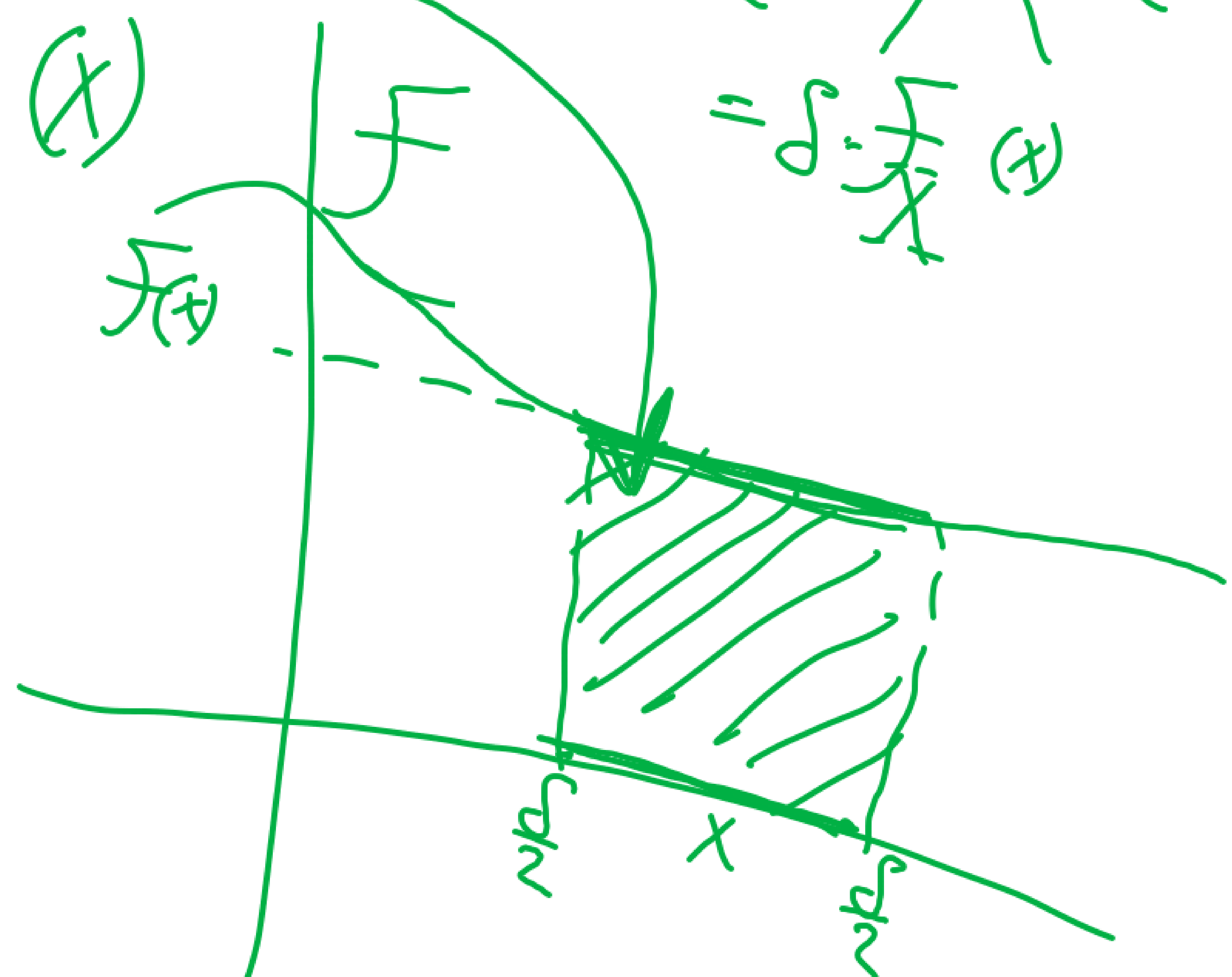
p.m.f.

$$P(X=x_i)=p_i$$

p.d.f.

$$f_X(x)$$

$$P\left(x-\frac{\delta}{2}<X<x+\frac{\delta}{2}\right) = \delta \cdot f_X(x)$$



$$P(a<X<b) = \int_a^b f(x)\,dx$$

1. $$\sum P_i = 1$$

$$P_5 = 1 - 0.95 = 0.05$$

b. $$E[X] = \sum_{i=1} X_i \cdot P(X = x_i)$$

$$= 2.38\%$$

$$P(X < 2.38\%) = 0.45$$

$$P(\{-2,-1,0,1\}) = \boxed{P(\{-2\} \cup \{-1\} \cup \{0\} \cup \{1\})} = \sum_{x_i < 2.38} P(X = x_i)$$

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

$$E[X] = \int_{-\infty}^{+\infty} x \cdot f_X(x)\,dx$$

$$P\{\omega_1, \omega_2, \omega_3\} = P(\{\omega_1\} \cup \{\omega_2\} \cup \{\omega_3\}) =$$

$$P(\omega_1) + P(\omega_2) + P(\omega_3)$$

$X=$	1	? a	3
$P(X=x_i)$	0.1	0.5	0.4

$Var(X)=0.41$

$E[X]-?$

$$Var(X)=E\left((X-E[X])^2\right)=$$

$$=E[X^2]-(E[X])^2=0.41$$

$$E[X^2]=\sum_{i=1}^{n} x_i^2 \cdot P(X=x_i)$$

$$=1\cdot 0{,}1+a^2\cdot 0{,}5+9\cdot 0{,}4=3.7+a^2\cdot \tfrac{1}{2}$$

$$E[X]=0.1+a\cdot 0.5+3\cdot 0.4=1.3+\tfrac{1}{2}\cdot a$$

$$0.5a^2+3.7-(1.3+0.5a)^2=0.41$$

$$0.5a^2+3.7-1.69-1.3a-0.25a^2=0.41$$

$$\boxed{0.25a^2-1.3a+1.6=0}$$

$$a^2 - 5.2a + 6.4 = 0$$

$$a_1 = 2; \quad a_2 = \frac{16}{5} > 3$$

$$E[X] = 1.3 + \frac{1}{2}a = 2.3$$

5. $X \sim N(0, 20^2)$

$N(\mu, \sigma^2)$

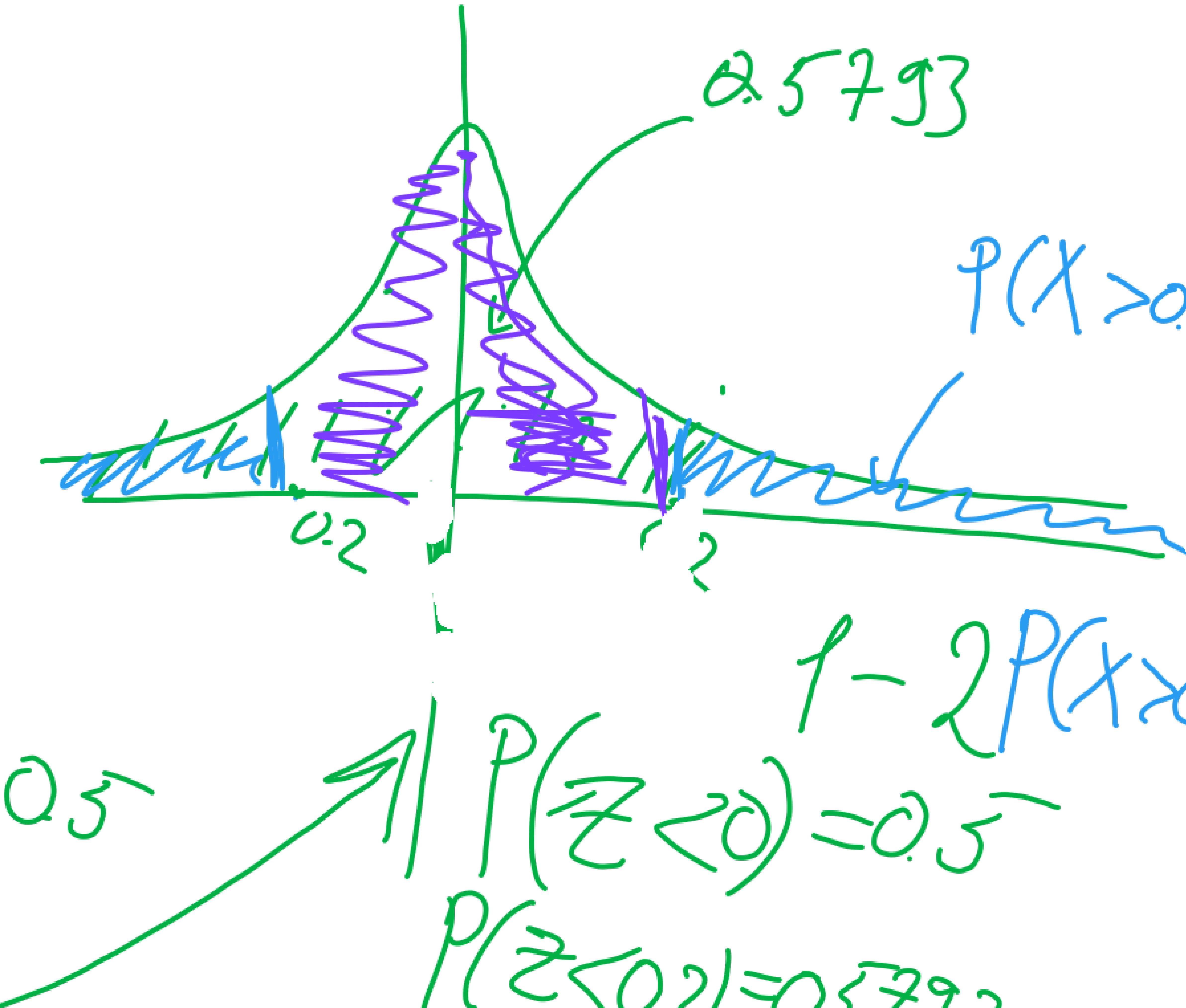
$$Z = \frac{X-\mu}{\sigma}$$

$Z \sim N(0, 1)$

$P(-4 < X < 4)$

$P(X < 4) \rightarrow P(Z < 0.2) =$

$= 0.5793$



$P(X > 0.2) = 1 - 0.5793$

$1 - 2P(X > 0.2) = P(-0.2 < Z < 0.2)$

$P(Z < 0) = 0.5$

$P(Z < 0.2) = 0.5793$

$2 \cdot P(0 < Z < 0.2) =$

$= 2 \cdot 0.0793 = 0.1586$

$$P(X=k)=C_n^k\, p^k (1-p)^{n-k}$$

$\underbrace{Б\,Б\,К\,Б\,\_\ \_\ \_\ \_\ К}_{10}$

$P(X=1)=(0{,}4)^1\cdot(0{,}6)^9\cdot C_{10}^1$

$P(X=2)=C_{10}^2\cdot(0{,}4)^2\cdot(0{,}6)^8$

$$P(X=1)+P(X=2)+P(X=3)=1-P(X=0)$$

$$P(X=0)=C_3^0\,(1-0{,}1586)^3$$

$$1-P(X=0)\approx 0{,}4$$