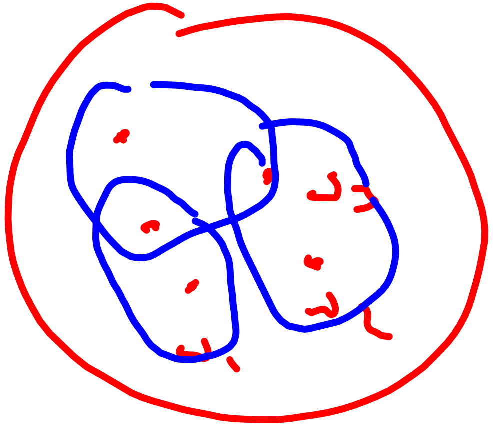


Ω

$A \subset 2^{\Omega}$

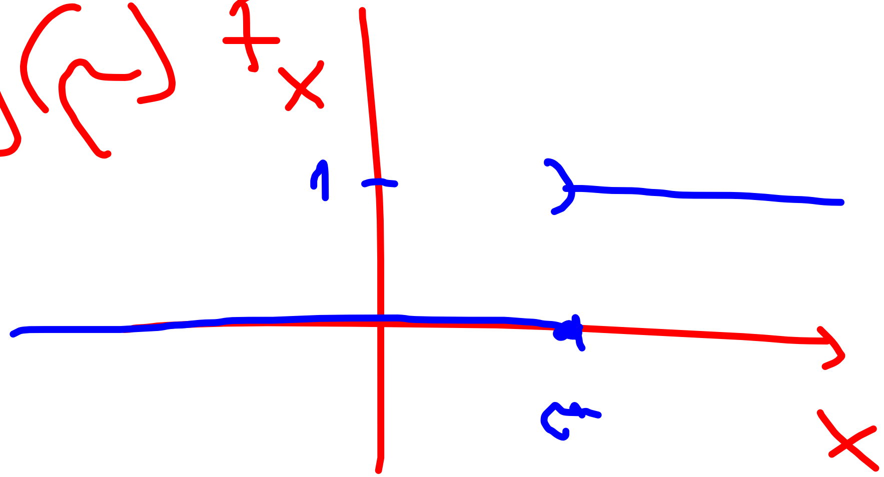
$P : A \to [0,1]$

$X : \Omega \to \mathbb{R}, \quad \mathbb{R}^n \quad \dots$

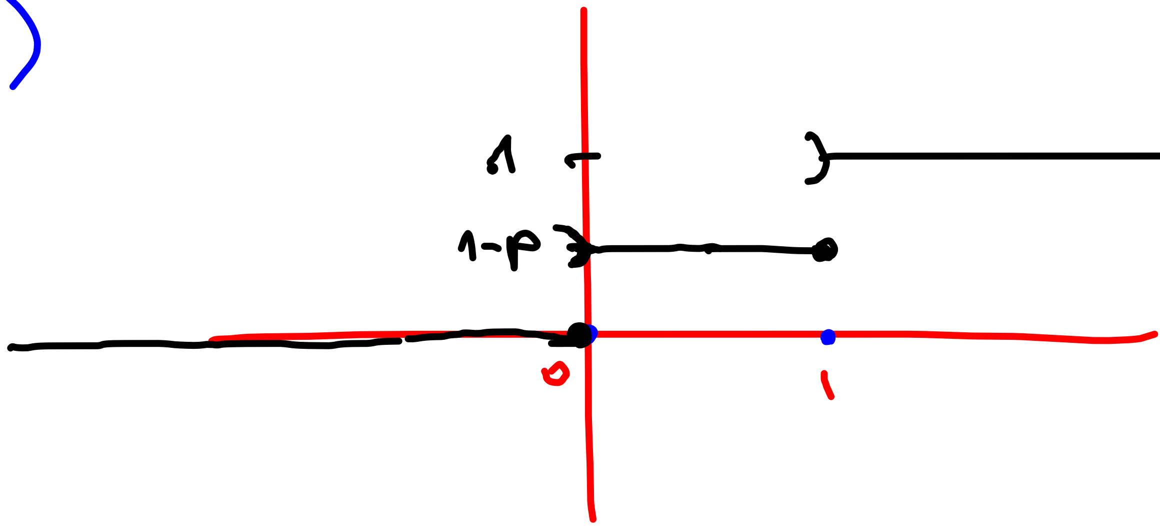
$X^{-1}(\langle a,b \rangle) \in A$

$$P(a<X<b) = \sum_{a<x_i<b} P(X=x_i) =$$

Dg(~) F_X



$A(p)$



$Bi(n,p)$ $\quad P(X = t)$:

- $t \times$ zdar
- $(n-t) \times$ nezdar

$\Rightarrow p^t \cdot (1-p)^{n-t}$

$\Rightarrow \binom{n}{t}$ možností

X_n : do n přihrádek r_n předmětů?

$$\boxed{r_n/n \sim \lambda}$$

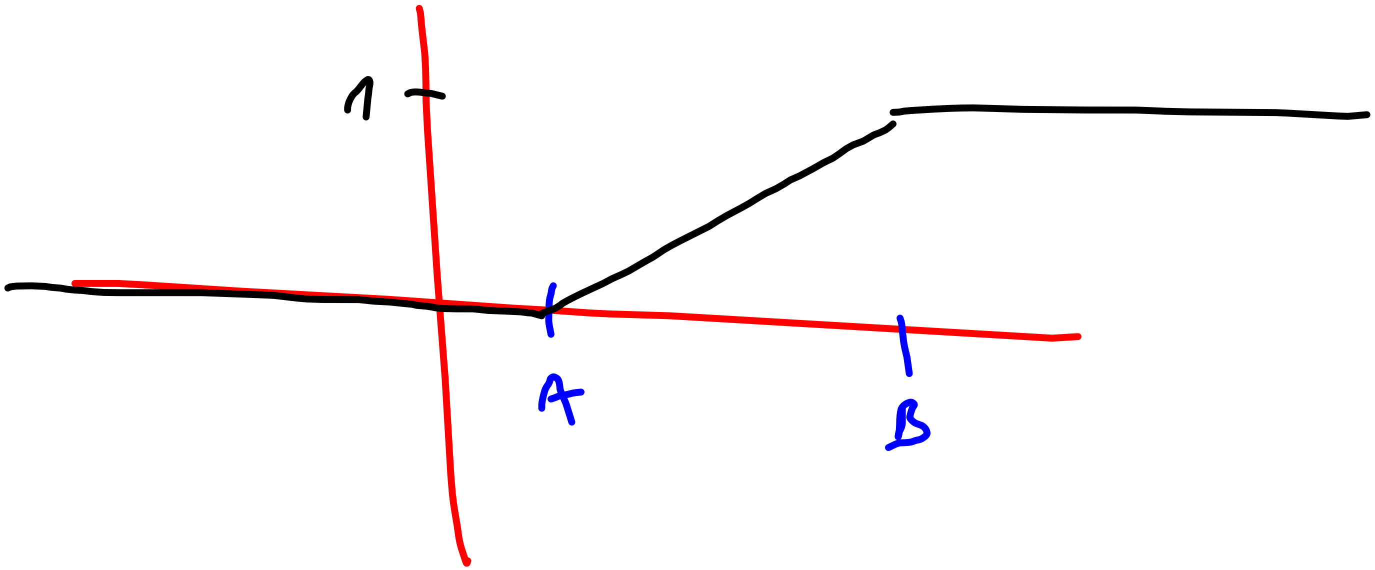
$$\left(1 + y/n\right)^n \xrightarrow[n \to \infty]{} e^y$$

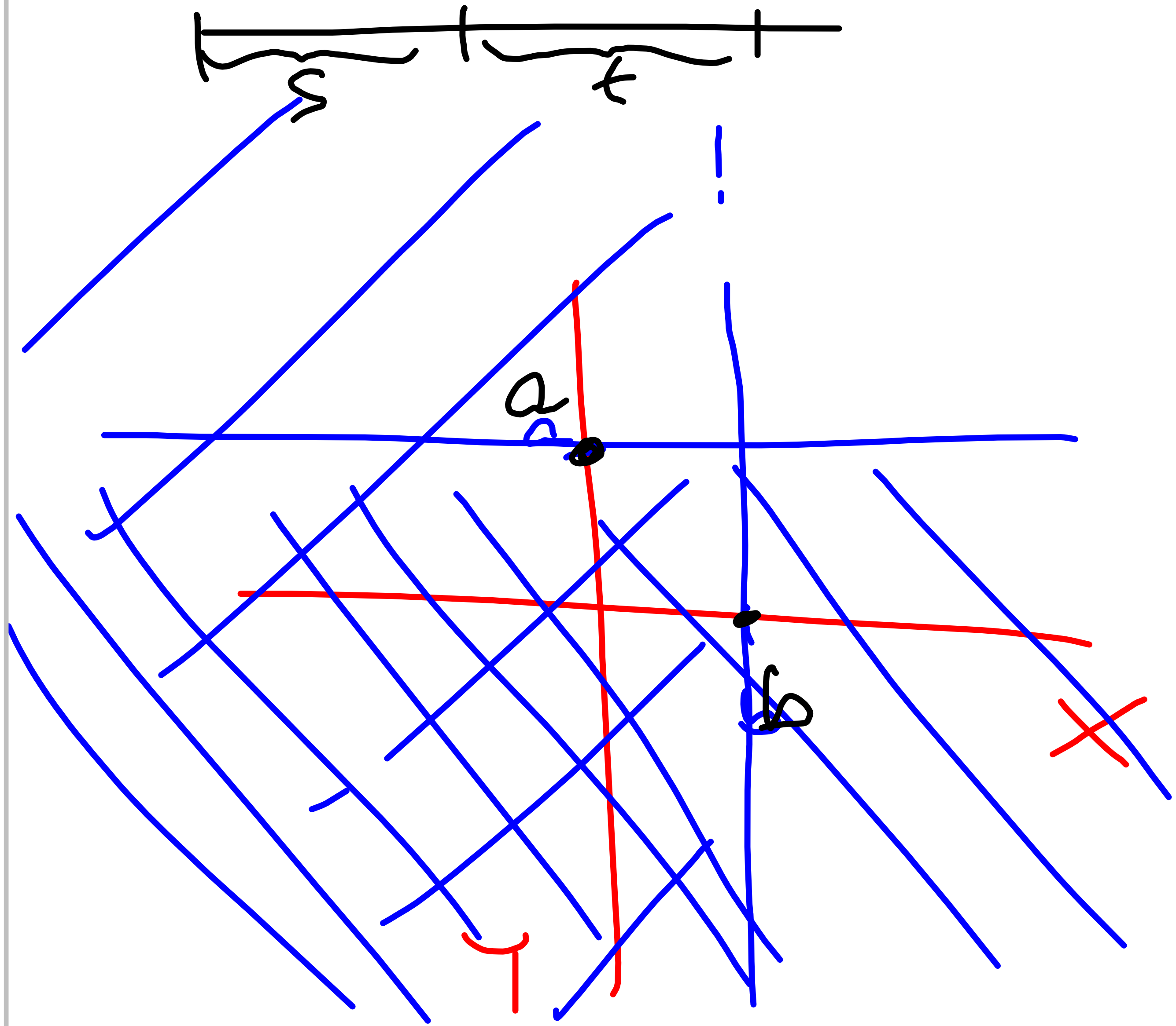
$$X_n \longrightarrow X$$ Poissonovo rozdělení

$$P(a_0 \le X < b_0) = \int_{a_0}^{b_0} f(x)\,dx = \frac{b_0 - a_0}{B - A}$$

rovnoměrné na $[A, B]$

$$F_X(t) = \int_{-\infty}^{t} f(x)\,dx = \frac{t - A}{B - A} \quad \Bigg| \begin{array}{l} \text{pro} \\ t > A \\ B > t \end{array}$$





s
t
a
b

$$X \longmapsto E(X) \in \mathbb{R}$$

<u>Střední hodnota:</u>

a) diskrétní X, hodnoty $k = 0, \ldots, n$

$$\sum_{k=0}^{n} k \cdot P(X = k)$$

obecně:

$$\boxed{\sum_{x_i : P(X = x_i) \neq 0} x_i P(X = x_i)} = E(X)$$

Př. $1 \cdot \frac{1}{6} + 2 \frac{1}{6} + \ldots + 6 \frac{1}{6} = \frac{21}{6} = \underline{\underline{3{,}5}}$

b) spojité:

$$\boxed{\int_{-\infty}^{\infty} x f(x)\, dx} = E(X)$$

$\Rightarrow$ předpoklad, že $\int_{-\infty}^{\infty} |x| f(x)\, dx < \infty$

Př. $X \sim Bi(n, p)$

$$EX = \sum_{k=0}^{n} k \cdot \binom{n}{k} p^k (1-p)^{n-k} = np \sum_{k=1}^{n} \frac{(n-1)!}{(n-k)!(k-1)!} p^{k-1} (1-p)^{n-k}$$

$$= np \underbrace{\sum_{j=0}^{n-1} \frac{(n-1)!}{j!(n-1-j)!} p^j (1-p)^{n-1-k}}_{1} = \underline{\underline{np}}$$

Tvrzení: $a, b \in \mathbb{R}$, X

$$E a = a$$

$$E(a + bX) = a + bX$$

$$E(X+Y) = EX + EY$$

$X = (X_1, \dots, X_n)$ náhodný vektor, a, B

$$E(a + BX) = a + B(EX)$$

vektor konstant

konst. matice

Tvrzení: X, Y nezávislé, pak $E(XY) =$

$$= E(X) \cdot E(Y)$$

$$\operatorname{var} X = E(X - EX)^2$$