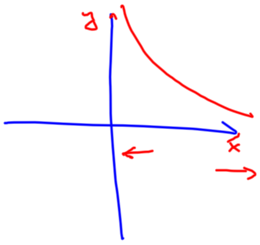
$y>0 \quad x>0 \quad y = 1/x$

$f(x, \cancel{y}) = 2x + 1/x$

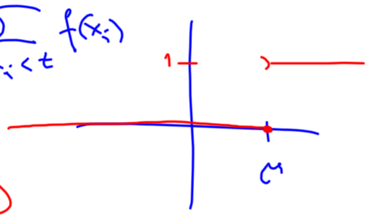
$f'(x) = 2 + \frac{-1}{x^2}$

$x^2 = 1/2 \qquad x = \sqrt{1/2}$



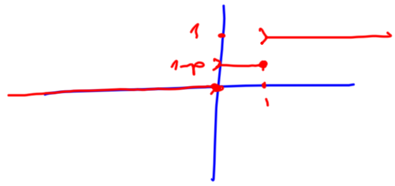
11 22-15:57

$F_X(t) = \sum_{x_i < t} f(x_i)$



$X \sim A(p)$

$F_X(t)$



11 22-16:25

$\binom{n}{k} p^k (1-p)^{n-k} = P(X=k) = f_X(k)$

$1 = (p + (1-p))^n = \dots + \binom{n}{k} p^k (1-p)^{n-k} + \dots$

$e^x = \left(1 + \frac{x}{n}\right)^n$

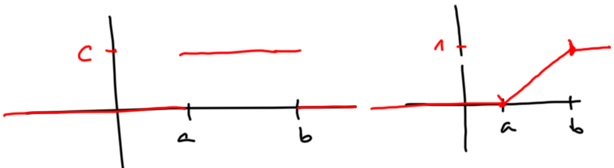
11 22-16:32

$X \sim Po(\lambda)$

$f_X(k) = \frac{\lambda^k}{k!} e^{-\lambda} \qquad k = 0, 1, \dots$

$\sum_{k=0}^{\infty} f_X(k) = e^{-\lambda} \sum_k \frac{\lambda^k}{k!} = e^{-\lambda+\lambda} = 1$

11 22-16:46

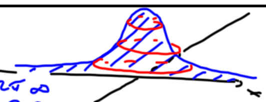


$\int_{-\infty}^{\infty} f_X(x)\,dx = 1 = \int_a^b c\,dx = c\cdot(b-a)$

$\Rightarrow \quad c = \frac{1}{b-a}$

11 22-16:54

$\int_{-\infty}^{\infty} e^{-x^2/2}\,dx = ?$



$\iint_{\mathbb{R}^2} e^{-\frac{1}{2}(x^2+y^2)}\,dx\,dy = \int_0^{2\pi}\int_0^{\infty} e^{-\frac{1}{2}r^2}\, r\,dr\,d\varphi$

$\|$

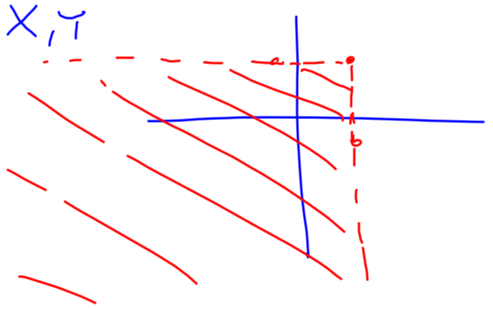
$\int_{-\infty}^{\infty}\int_{-\infty}^{\infty} e^{-\frac{1}{2}x^2} \cdot e^{-\frac{1}{2}y^2}\,dx\,dy = \int_0^{2\pi}\int_0^{\infty} e^{-t}\,dt\,d\varphi \qquad \frac{1}{2}r^2 = t$

$\left(\int_{-\infty}^{\infty} e^{-\frac{1}{2}x^2}\,dx\right)^2 = 2\pi$

$$\boxed{f_X(x) = \frac{1}{\sqrt{2\pi}} e^{-x^2/2}}$$

11 22-17:09

$X, Y$




$$F(b,a) = \sum_{\substack{x_i < b \\ y_j < a}} f(x_i, y_j)$$

11 22-17:20

$$F(x,y) = G(x)\cdot H(y) \iff$$

diskrétní: $f(x,y) = f_X(x)\cdot f_Y(y)$ pravd. fce

spojité: $f(x,y) = f_X(x)\cdot f_Y(y)$ hustota

$(X_1, \ldots, X_n)$ $\quad X_i \simeq X \sim A(p)$

$Y = X_1 + \ldots + X_n$ $\quad x_i \in \{0,1\}$ $\quad f_X(0) = 1-p$

$f_X(1) = p$

$$f_Y(k) = \sum_{x_1+\ldots+x_n = k} f_X(x_1)\cdots f_X(x_n)$$

$$= \binom{n}{k} p^k (1-p)^{n-k}$$ ✓

11 22-17:26