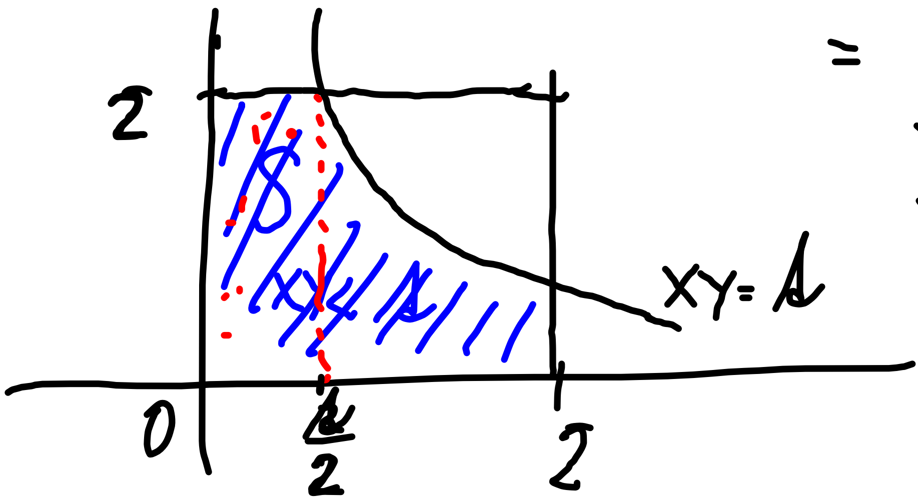
X, Y nezávislé $\Rightarrow$ $f_{(X,Y)}(s,t) = f_X(s) \cdot f_Y(t)$
$= \frac{t}{4}$

$F_{XY}(t) = P[XY < t] = P[(X,Y) \in S] =$



$= \iint_S f_{(X,Y)}(s,t)\, ds\, dt =$

$= \int_0^{t/2} \int_0^{2} \frac{y}{4}\, dy\, dx +$

$+ \int_{t/2}^{2} \int_0^{t/x} \frac{y}{4}\, dy\, dx =$

$= \int_0^{t/2} \left[\frac{y^2}{8}\right]_0^2 dx + \int_{t/2}^{2} \left[\frac{y^2}{8}\right]_0^{t/x} =$

$a \in (0,4)$

$$\int_0^{\frac{a}{2}} \frac{1}{2}\,dx + \frac{1}{8}\int_{\frac{a}{2}}^{2} \frac{a^2}{x^2}\,dx = \frac{1}{2}\left[\frac{a}{2}\right] + \frac{a^2}{8}\left[-\frac{1}{x}\right]_{\frac{a}{2}}^{2} =$$

$$= \frac{a}{4} + \frac{a^2}{8}\left[-\frac{1}{2} + \frac{2}{a}\right] = \frac{a}{4} + \frac{a}{4} - \frac{a^2}{16} = \frac{a}{2} - \frac{a^2}{16}$$

$$f_{XY}(a) = \frac{1}{2} - \frac{a}{8} \qquad (\text{pro } a \in (0,4))$$

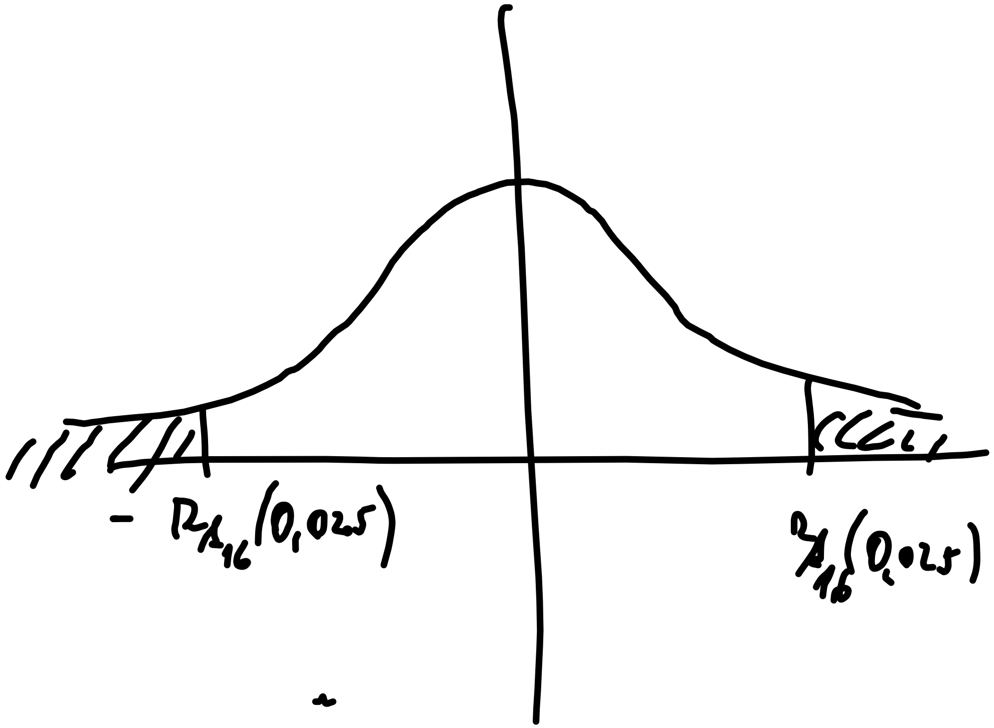
$$T = \frac{\overline{T}_1 - \overline{T}_2}{S} \cdot \sqrt{\frac{n_1 n_2}{n_1 + n_2}} \sim t_{n_1+n_2-2}$$

$$\overline{T}_1 = 21{,}3$$

$$\overline{T}_2 = 24{,}125$$

$$S \doteq 21{,}15$$

$$T \doteq \pm\, 0{,}282$$



Y_i ... váhy

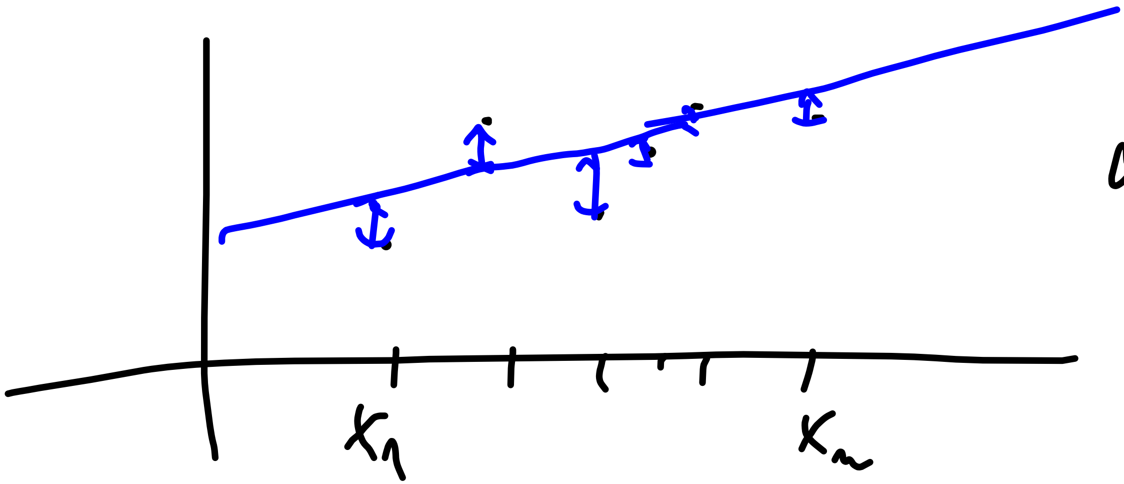
X_i ... rozjezdy

Předpokládáme závislost $Y = aX + b$,

kde $a, b \in \mathbb{R}$

$\bar{Y} = \frac{1}{n}\sum Y_i$

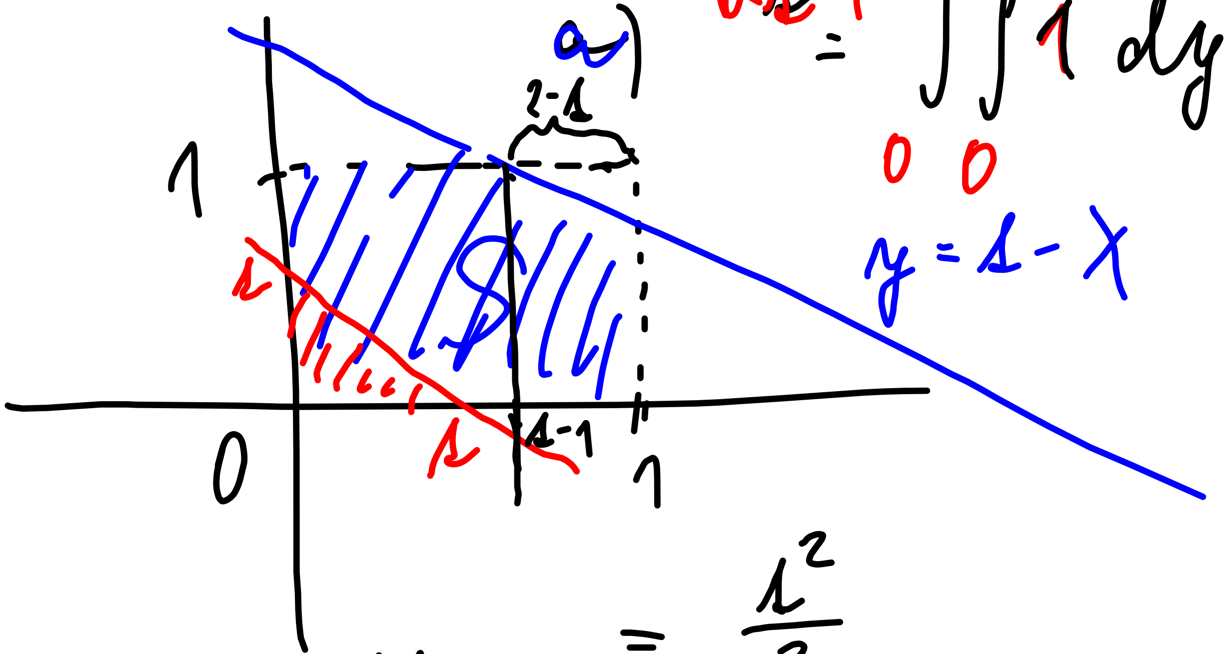
Metodou nejmenších čtverců



$$a = \frac{\sum_i (Y_i - \bar{Y})(X_i - \bar{X})}{\sum_i (X_i - \bar{X})^2}$$

$$b = \bar{Y} - a\bar{X}$$

$$P[X+Y<s] = F_{X+Y}(s) = P[(X,Y)\in S] =$$



$0<s\le 1$
$$= \int_0^{s}\int_0^{s-x} 1\,dy\,dx = \frac{s^2}{2}$$

b) $1\le s<2$
$$= \int_0^{s-1}\int_0^{1} 1\,dy\,dx + \int_{s-1}^{1}\int_0^{s-x} 1\,dy\,dx = 1-\frac{1}{2}(2-s)^2 =$$
$$= 1-2-\frac{1}{2}s^2+2s =$$
$$= 2s-\frac{1}{2}s^2-1$$

b) Hustota psti veličiny (X, Y) je

$$f_{(X,Y)}(x,y) = 4xy \quad (\text{pro } 0<x,y<1)$$

$$F_{X+Y}(s) = P[X+Y<s] =$$

$0<s<1$

$$= \int_0^s \int_0^{s-x} 4xy \, dy \, dx = \int_0^s \left[2xy^2\right]_0^{s-x} dx =$$

$$= \int_0^s 2x(s-x)^2 = \int_0^s \left(2xs^2 - 4x^2 s + 2x^3\right) dx =$$

$$= \left[x^2 s^2 - \frac{4}{3}x^3 s + \frac{x^4}{2}\right]_0^s = s^4 - \frac{4}{3}s^4 + \frac{s^4}{2} = \frac{s^4}{6}$$

$$\int_0^{1-1}\int_0^1 4xy\,dy\,dx + \int_{1-1}^1 \int_0^{1-x} 4xy\,dy\,dx =$$

$$= \left[\frac{x^2}{2}\right]_0^{1-1} \cdot \left[y^2\right]_0^1 + \int_{1-1}^1 \left[2xy^2\right]_0^{1-x} dx =$$

$$= (1-1)^2 + \int_{1-1}^1 2x(1-x)^2 = (1-1)^2 + \left[x^2 1^2 - \frac{4}{3}x^3 1 + \frac{x^4}{2}\right]_{1-1}^1 =$$

$$= \frac{1^4}{2} - 3 1^3 + 6 1^2 - 4 1 + 1$$