

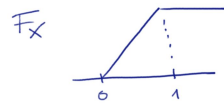
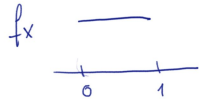
20u: rýchlôt rýšen' ... X [úlohy/úrad.]

(T) čas pre rýšen' 5 úloh

$E T = ?$

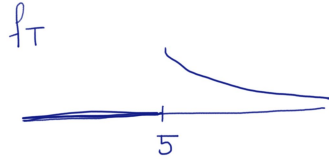
$5 \leq T < \infty$

$X = \frac{5}{T} \Leftrightarrow T = \frac{5}{X}$

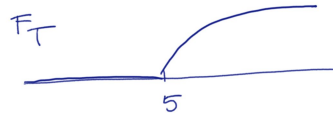


$F_X(x) = \begin{cases} 0 & (-\infty, 0) \\ x & (0, 1) \\ 1 & (1, \infty) \end{cases}$

$F_T(x) = P[T \leq x] = P[\frac{5}{X} \leq x] = P[\frac{x}{5} \geq \frac{1}{X}] = P[X \geq \frac{5}{x}] = 1 - P[X < \frac{5}{x}] = 1 - P[X \leq \frac{5}{x}]$



$F_T(x) = 1 - F_X(\frac{5}{x}) = \begin{cases} 0 & (-\infty, 5) \\ 1 - \frac{5}{x} & (5, \infty) \end{cases}$



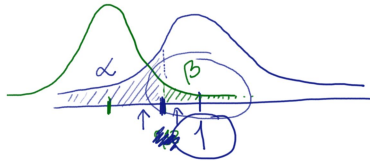
$f_T(x) = \begin{cases} 0 & (-\infty, 5) \\ \frac{5}{x^2} & (5, \infty) \end{cases}$

$E T = \int_{-\infty}^{\infty} x f_T(x) dx = \int_5^{\infty} x \frac{5}{x^2} dx = 5 \int_5^{\infty} \frac{1}{x} dx = 5 [\ln|x|]_5^{\infty} = 5(\ln \infty - \ln 5) = \infty$

(2)

$n=16$
 $\bar{x} = 0,98 \text{ kg}$
 $\Delta x = 0,04 \text{ kg}$

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



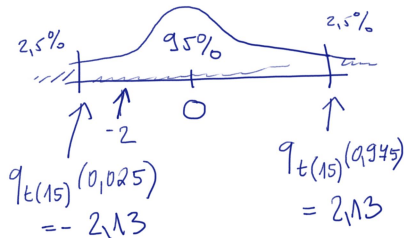
$T = \frac{\bar{X} - c}{\sqrt{\frac{S_X^2}{n}}} \sim t(n-1)$



$\alpha = 5\%$

$H_0: \mu = 1 \dots T = 0$; $H_1: \mu \neq 1 \dots T \neq 0$

$t = \frac{\bar{x} - 1}{\Delta x} \sqrt{n} = \frac{0,98 - 1}{0,04} \sqrt{16} = \frac{-0,02}{0,04} \cdot 4 = -2$



H_0 nezamítame

(3)

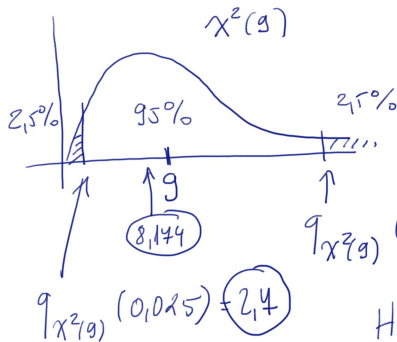
$n=10$
 $\bar{x} = 0,3483$
 $\Delta_x^2 = 0,9082$

X generator $N(0,1)$

$H_0: \sigma^2 = 1$
 $H_1: \sigma^2 \neq 1$ $\alpha = 5\%$

$T = (n-1) \frac{S_X^2}{c} \sim \chi^2(n-1)$

$t = 9 \cdot \frac{0,9082}{1} = 8,174$



$q_{\chi^2(9)}(0,975) = 19,02$

H_0 nezamítame

4

X	>	Y
$m=13$		$m=9$
$\bar{x} = 1,02 \text{ kg}$		$\bar{y} = 0,83 \text{ kg}$
$s_x^2 = 0,04 \text{ kg}^2$		$s_y^2 = 0,09 \text{ kg}^2$
$s_x = 0,2 \text{ kg}$		$s_y = 0,3 \text{ kg}$

porovnaní rozptylů

$$T = \frac{s_x^2}{s_y^2} \sim F(m-1, m-1)$$

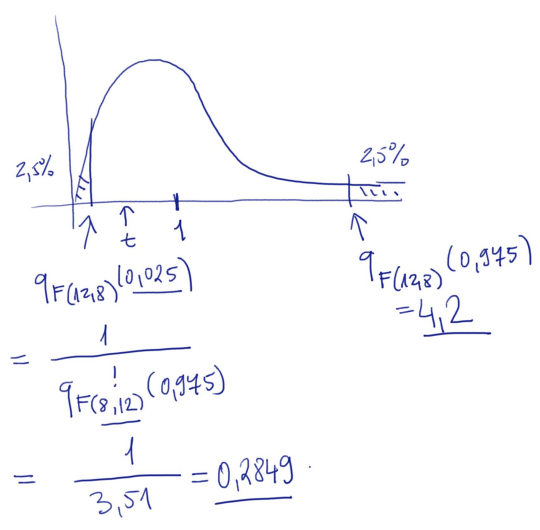
$$H_0: \sigma_x^2 = \sigma_y^2 \dots T=1$$

$$H_1: \sigma_x^2 \neq \sigma_y^2 \dots T \neq 1$$

$$\alpha = 5\%$$

H_0 nezamítáme

\Rightarrow nepodařilo se dovézt, že $\sigma_x^2 \neq \sigma_y^2$



porovnaní středních hodnot

$$H_0: \mu_x = \mu_y ; H_1: \mu_x \neq \mu_y$$

$$H_0: \mu_x \geq \mu_y ; H_1: \mu_x < \mu_y$$

$$H_0: \boxed{\mu_x \leq \mu_y} ; H_1: \underline{\mu_x > \mu_y}$$

$$\underline{\underline{T \leq 0}}$$

$$T = \frac{\bar{x} - \bar{y}}{S \sqrt{\frac{1}{m} + \frac{1}{n}}} \sim t(m-1+n-1)$$

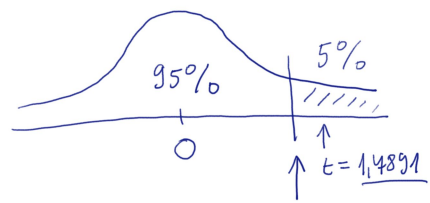
$$\sim t(20)$$

$$S^2 = \frac{2 \cdot (m-1) s_x^2 + (n-1) s_y^2}{m-1+n-1}$$

$$s^2 = \frac{12 \cdot 0,04 + 8 \cdot 0,09}{12+8} = 0,06$$

$$s = \sqrt{0,06}$$

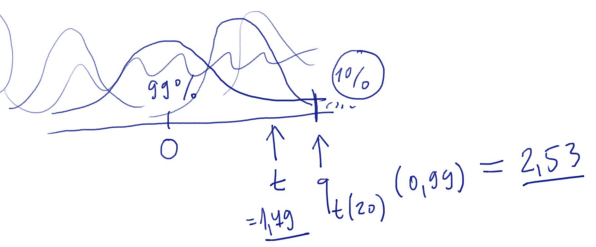
$$t = \frac{\bar{x} - \bar{y}}{s \sqrt{\frac{1}{m} + \frac{1}{n}}} = \frac{1,02 - 0,83}{\sqrt{0,06} \sqrt{\frac{1}{13} + \frac{1}{9}}} = \frac{0,19}{0,1062} = 1,7891$$



$$q_{t(20)}(0,95) = 1,72$$

H_0 zamítáme $\Rightarrow \mu_x > \mu_y$ (s prav. chyby 5%)

$$\alpha = 1\%$$



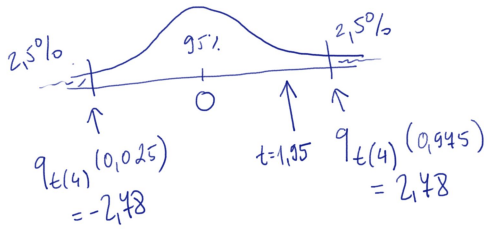
H_0 nezamítáme

5) párový test

i	x_i	y_i	δ_i	$\delta_i - \bar{\delta}$	$(\delta_i - \bar{\delta})^2$
1	26,5	24,0	2,5	1,5	2,25
2	25,0	23,5	1,5	0,5	0,25
3	24,3	24,4	-0,1	-1,1	1,21
4	26,3	25,0	1,3	0,3	0,09
5	22,0	22,2	-0,2	-1,2	1,44
			$\sum \delta_i = 5,0$		5,24
			$\bar{\delta} = 1,0$		$s_{\Delta}^2 = \frac{5,24}{4} \approx 1,31$

$\alpha = 5\%$

$H_0: \mu_x = \mu_y \text{ (T=0)}; H_1: \mu_x \neq \mu_y$



$T = \frac{\bar{\Delta}}{s_{\Delta}} \sqrt{n} \sim t_{(n-1)}$

$\Delta = X - Y$

$t = \frac{1,0}{\sqrt{1,31}} \sqrt{5} \approx 1,9536$

H_0 nezamítáme

$H_0: \mu_x \leq \mu_y$