You want to test whether therapy sessions decrease stress levels of patients. For this purpose you obtained 10 measurements of stress on the scale from 0 to 100. Assuming symmetrical (but not normal) probability distribution (of differences), find out if stress levels change after therapy. Use $\alpha = 0,05$

Patient	1	2	3	4	5	6	7	8	9	10
Before	75	68	83	90	70	98	72	99	75	98
After	68	70	60	95	51	90	75	88	60	80
$B_i - A_i$	7	-2	23	-5	19	8	-3	11	15	18

$H_0: X_{0.5} = C = 0$ $\alpha = 0.05$

$H_A: X_{0.5} \neq 0$

$\rightarrow$

2	3	5	7	8	11	15	18	19	23
1	2	3	4	5	6	7	8	9	10

$\sum$ pořadí, které náleží $d_i > 0$

$S^+ = 49$ 8 je hodnota z tabulky

$$\overline{W}_\alpha = \left(8; \frac{n(n+1)}{2} - 8\right) = (8; 47)$$

$S^+ \notin \overline{W}_\alpha \Rightarrow$ zamítáme H_0

došlo ke změně hl. stresu

You want to compare monthly income similarly employed people in 2 different regions. Since you can't account for different occupations, you expect the underlying probability distributions to be heavily skewed. Using $\alpha = 0,05$ and following data [1000 Kč], test whether the median income is the same.

X 73   ‾11.5 ‾4 ‾1.5 ‾5 ‾16 ‾17 ‾7 ‾8 ‾3

| | R 1 | 43,6 | 41,2 | 40,7 | 41,6 | 47,2 | 49,0 | 42,1 | 42,2 | 40,8 | |
| | R 2 | 43,7 | 49,5 | 43,1 | 43,4 | 45,2 | 47,0 | 43,6 | 40,7 | 41,8 | 55,2 |

a
10

Y 106   13 18 9 10 14 15 11.5 1.5 6 19

$H_0: X_{0.5} = Y_{0.5}$

$H_A: X_{0.5} \neq Y_{0.5}$

- Data dohromady $\Rightarrow$ velký soubor
- u sporádat
- Suma pořadí pro prvky z X

$$S^X = 73$$

$$U_x = n_x n_y + \frac{n_x(n_x+1)}{2} - S_x = 90 + 45 - 73 = 135 - 73 = \underline{62}$$

$$\underset{9 \quad 9 \quad 10}{\min \{ U_x \; ; \; n_x(n_x+n_y+1) - U_x \}} \overset{180 \quad -62}{=} \min \{ 62 \; ; \; 118 \} = \underline{\underline{62}} = t$$

$$\bar{W}_\alpha = (20 \; ; \; \text{pravá hranice} - 20)$$

$$t \in \bar{W}_\alpha \Rightarrow \underline{H_0 \text{ nezamítáme}}$$

Test whether there is some monotonous relation between the amount of points obtained before the exam and during the exam of some course taught at BUT. Use $\alpha = 0,05$ and following observations.

		10	8	2	5	4	6	7	9	3	1
R_x	before	40	35	21	31,5	28,5	33,5	34	38	25	20
R_y	during	60	51	42	40	43,5	47	52	58,5	55	40
		10	6	3	1.5	4	5	7	9	8	1.5

$n = 10$

$\bar{R}_x = \frac{n(n+1)}{2n} = \frac{11}{2} = 5.5 = \bar{R}_y$

$10 \cdot 5.5 \cdot 5.5 = 302.5$

$\bar{R} - R$

4.5	2.5	3.5	0.5	1.5	0.5	1.5	3.5	2.5	4.5
4.5	0.5	2.5	4	1.5	0.5	1.5	3.5	2.5	4

$s(R_x) = 3,0277$

$s(R_y) = 3,0185$

$r(R_x, R_y) = 0.9356$

$t = \frac{|r| \sqrt{n-2}}{\sqrt{1-R^2}} = 3,07 \Rightarrow t \notin \overline{W_\alpha}$

$\overline{W_\alpha} = \langle 0; t_{1-\frac{\alpha}{2}}(n-1)\rangle = \langle 0; 2.306\rangle$ $\Rightarrow$ zamít. H_0

BONUS

Logistic regression model