DAD 1

PARTIAL 2, TYPE A

JUNE, 2016

EXERCISE 1.

$n = 196$

$\bar{x} < \begin{matrix} 18.6 \\ 21.4 \end{matrix}$

$CI = 95\% \rightarrow z_{\alpha/2} = 1.96$

$S = 10$

$\bar{x} = ?$

$$\bar{x} \pm z_{\alpha/2} \cdot \frac{S}{\sqrt{n-1}} < \begin{matrix} 18.6 \\ 21.4 \end{matrix}$$

$$\bar{x} \pm 1.96 \cdot \frac{10}{\sqrt{196-1}} \quad 13.96$$

$$\bar{x} + 1.96 \cdot 0.72 = 21.4$$

$$\bar{x} + 1.41 = 21.4 \rightarrow \bar{x} = 21.4 - 1.4 = 20$$

EXERCISE 2

a) Fisher exact test because:

- Samples are independent
- Both variables are dichotomous / nominal
- χ^2 assumptions are violated:
  - $N = 10$ instead of $N > 20$
  - cells have expected values < 5 instead of ≥ 5

b) No because sig (2-sided) $= 1 > \alpha = 0.01$ — Null hypothesis is accepted

EXERCISE 3

a) t-test for dependent samples because:

- The independent variable is dichotomous (two measurement moments)
- The dependent variable is quantitative (competence)
- Assumptions are accepted
- It is a longitudinal study (each participant gives a competence score in each condition of the independence variable: before and after the training).

b) Yes because sig < 0.001 $< \alpha = 0.01$ — Null hypothesis was rejected.

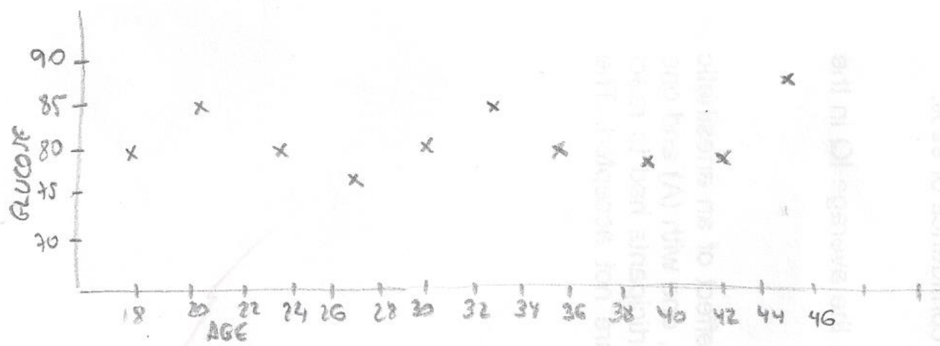
EXERCISE 4

$N=10$

	AGE (X)	GLUCOSE (Y)	XY	X^2	Y^2
	18	80	1440	324	6400
	21	85	1785	441	7225
	24	80	1920	576	6400
	27	76	2052	729	5776
	30	80	2400	900	6400
	33	87	2871	1089	7569
	36	80	2880	1296	6400
	39	78	3042	1521	6084
	42	80	3360	1764	6400
	45	90	4050	2025	8100
Σ	315	816	25800	10665	66754

c) 0.27 is a low value, taking into account that the highest possible score is 1.
The scatter plot shows that there is relationship between variables, but not linear.
Pearson correlation is not appropriate to study non-linear relationships.

a) SCATTER PLOT (RELATIONSHIP OF TWO QUANTITATIVE VARIABLES)



b) $$r_{xy} = \frac{\frac{\Sigma XY}{N} - \bar{X}\bar{Y}}{S_X S_Y} = \frac{\frac{25800}{10} - 31.5 \cdot 81.6}{8{,}62 \cdot 4{,}1} = \frac{2580 - 2570.4}{35.34} = \frac{9.6}{35.34} = 0.27$$

$$\bar{X} = \frac{315}{10} = 31.5 \qquad \bar{Y} = \frac{816}{10} = 81.6$$

$$S_X = \sqrt{\frac{\Sigma X^2}{N} - \bar{X}^2} = \sqrt{\frac{10665}{10} - 31.5^2} = \sqrt{1066.5 - 992.25} = \sqrt{74.25} = 8.62$$

$$S_Y = \sqrt{\frac{\Sigma Y^2}{N} - \bar{Y}^2} = \sqrt{\frac{66754}{10} - 81.6^2} = \sqrt{6675.4 - 6658.56} = \sqrt{16.84} = 4.1$$