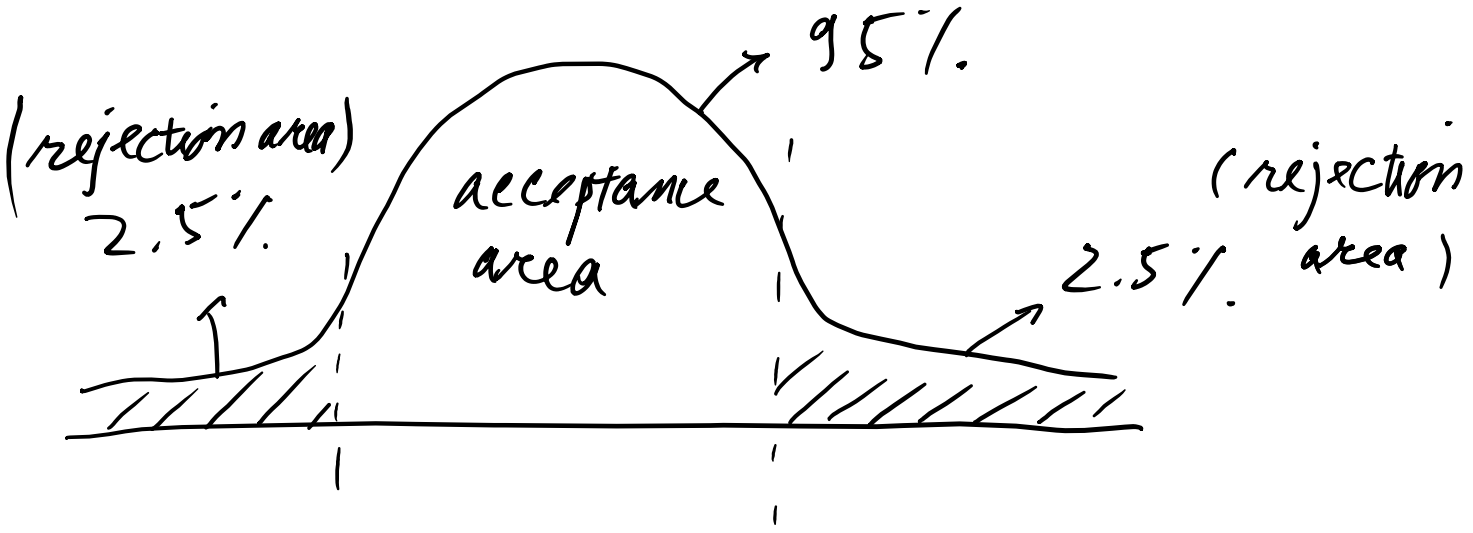
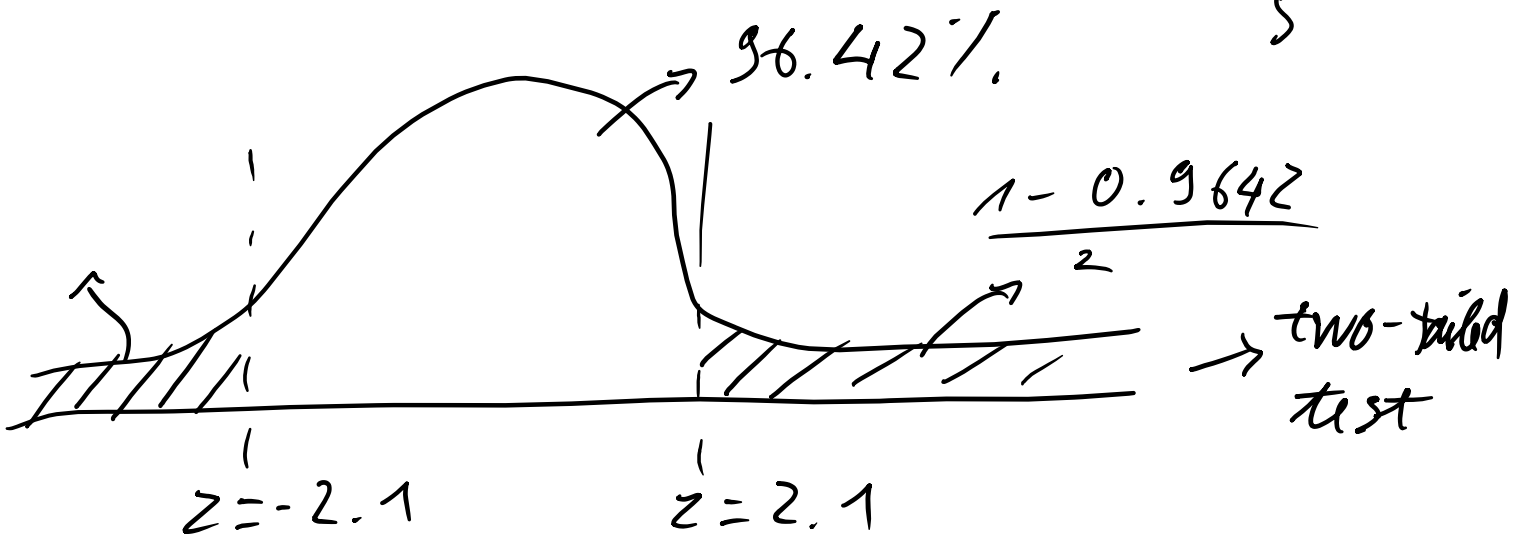


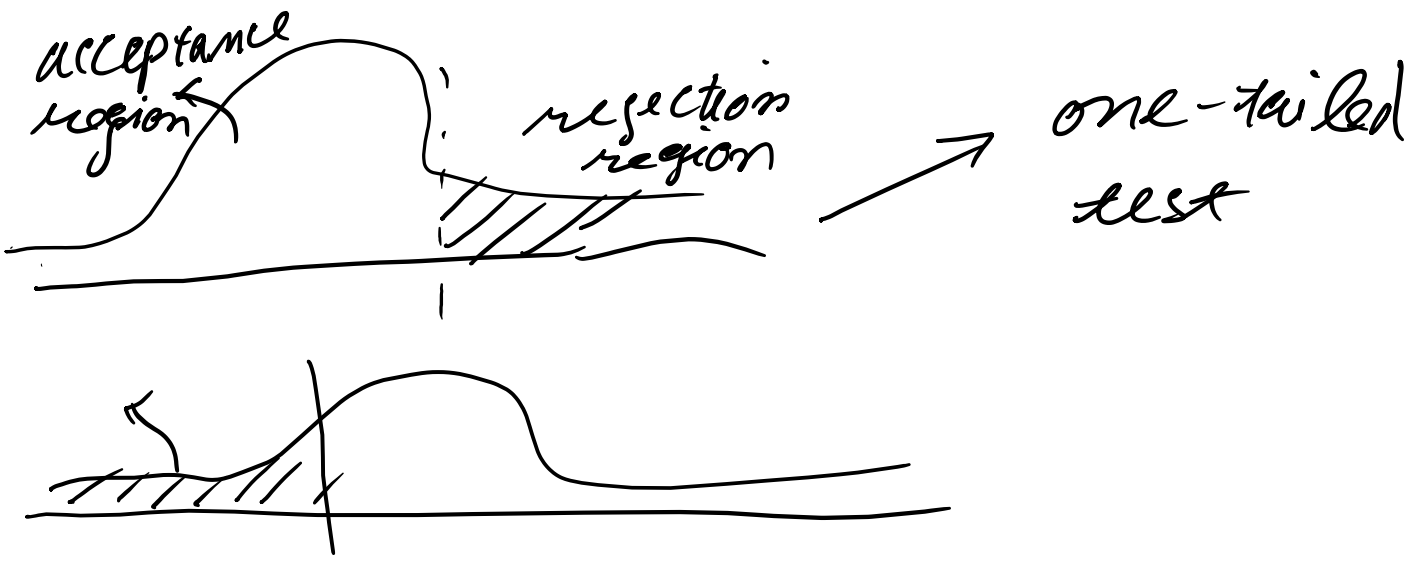

5%. level of significance

(rejection rate)

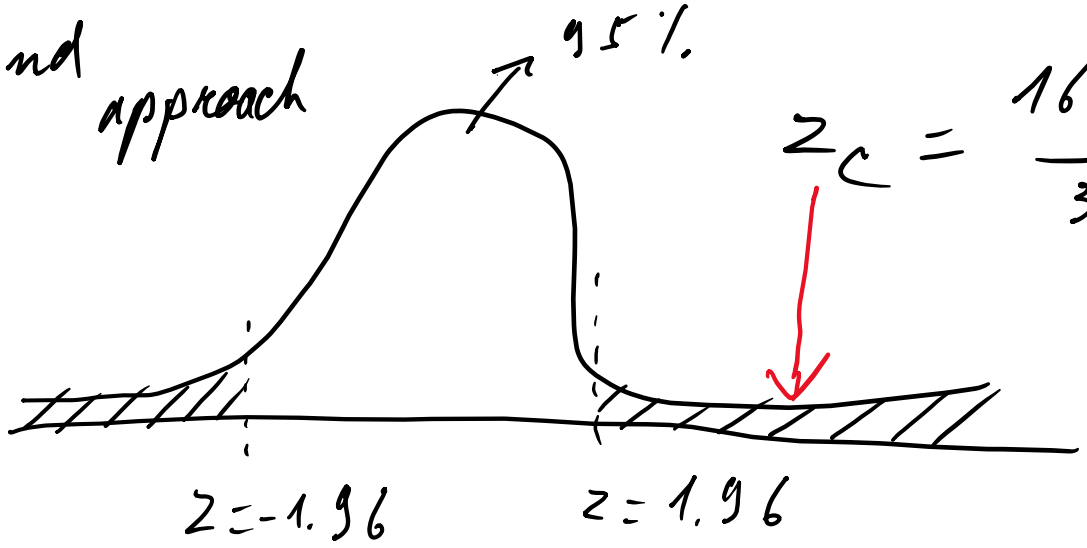
$$\frac{60,5-50}{5}=2.1$$

$$\frac{39.5-50}{5}=-2.1$$



2nd approach




$$z_c = \frac{169.5 - 168}{3.9/\sqrt{36}} = 2.31$$

$2.31 > 1.96$ → reject the hypothesis

Area where $z < -2.31$ & $z > 2.31$

$$\text{Area}(z < -2.31) = 0.5 - \text{Area}(0 \to 2.31)$$
$$= 0.5 - 0.4896$$
$$= 0.0104$$

dependent variable

independent variable

$y = a + bx$

regression equation of $y$ on $x$

$x_1 \rightarrow y_{est.1}$

$x_2 \rightarrow y_{est.2}$

$\vdots$

$\rightarrow$ regression

$$y = \frac{6}{11} + \frac{7}{11}x$$

In-class exercise:

$x = c + dy$ → independent vari.

dependent vari.

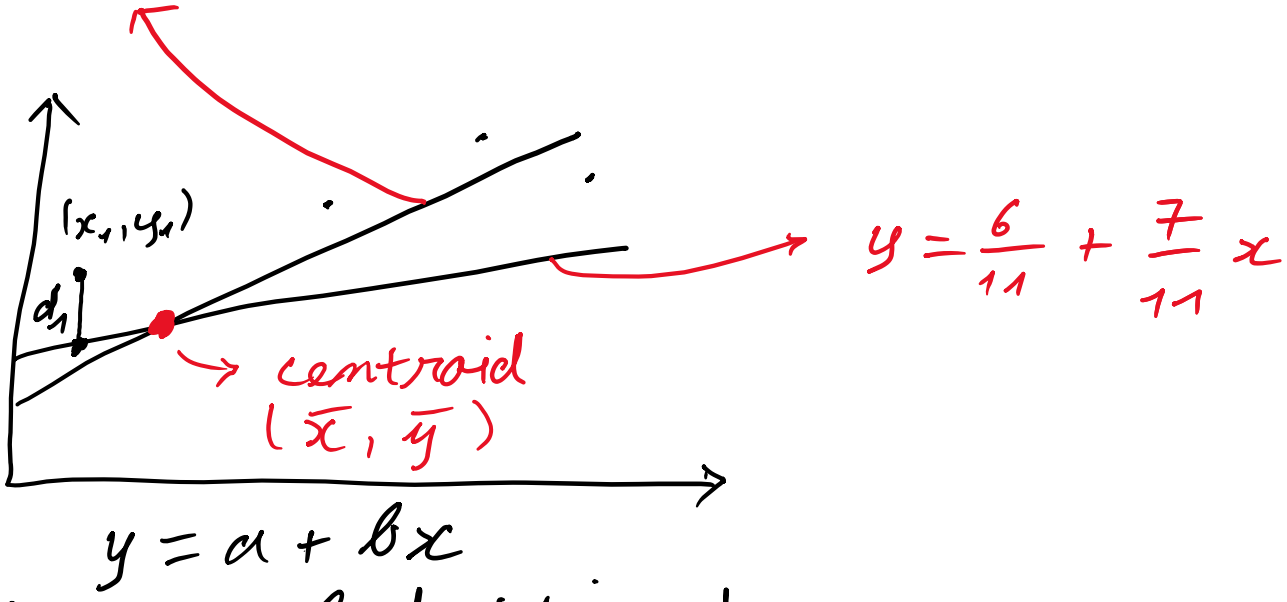
$$\begin{cases} \Sigma x = cn + d\Sigma y \\ \Sigma xy = c\Sigma y + b\Sigma y^2 \end{cases} \rightarrow \begin{cases} 8c + 40d = 56 \\ 40c + 256d = 364 \end{cases}$$

$\rightarrow \quad c = -1/2 \;\&\; d = 3/2$

$$x = -1/2 + \frac{3}{2}y$$

$$y = \frac{6}{11} + \frac{7}{11}x$$

$$x = -\frac{1}{2} + \frac{3}{2}y \rightarrow y = \left(x + \frac{1}{2}\right) \cdot \frac{2}{3}$$




The vertical deviation: $d_1 = y_{est.1} - y_1$

$= a + bx_1 - y_1$

$d_2 = a + bx_2 - y_2$

$\vdots$

The sum of square of deviations:

$$d_1^2 + d_2^2 + \ldots + d_n^2 = (a + bx_1 - y_2)^2 + \ldots$$
$$+ (a + bx_n - y_n)^2$$

$$\Leftrightarrow \sum d^2 = \sum (a + bx - y)^2$$

$$\Leftrightarrow F(a, b) = \sum (a + bx - y)^2$$

Find the minimum / maximum of $F$

$$\frac{\partial F}{\partial a} = \sum 2(a + bx - y)$$

$$\frac{\partial F}{\partial b} = \sum 2x(a + bx - y)$$

$$\frac{\partial F}{\partial a} = 0 \qquad \frac{\partial F}{\partial b} = 0$$

$$\Rightarrow \begin{cases} \sum (a + bx - y) = 0 \\ \sum [x(a + bx - y)] = 0 \end{cases} \Rightarrow \begin{cases} \sum y = na + b\sum x \\ \sum xy = a\sum x + b\sum x^2 \end{cases}$$

$$\rho = \frac{\sigma_{xy}}{\sigma_x \sigma_y}$$