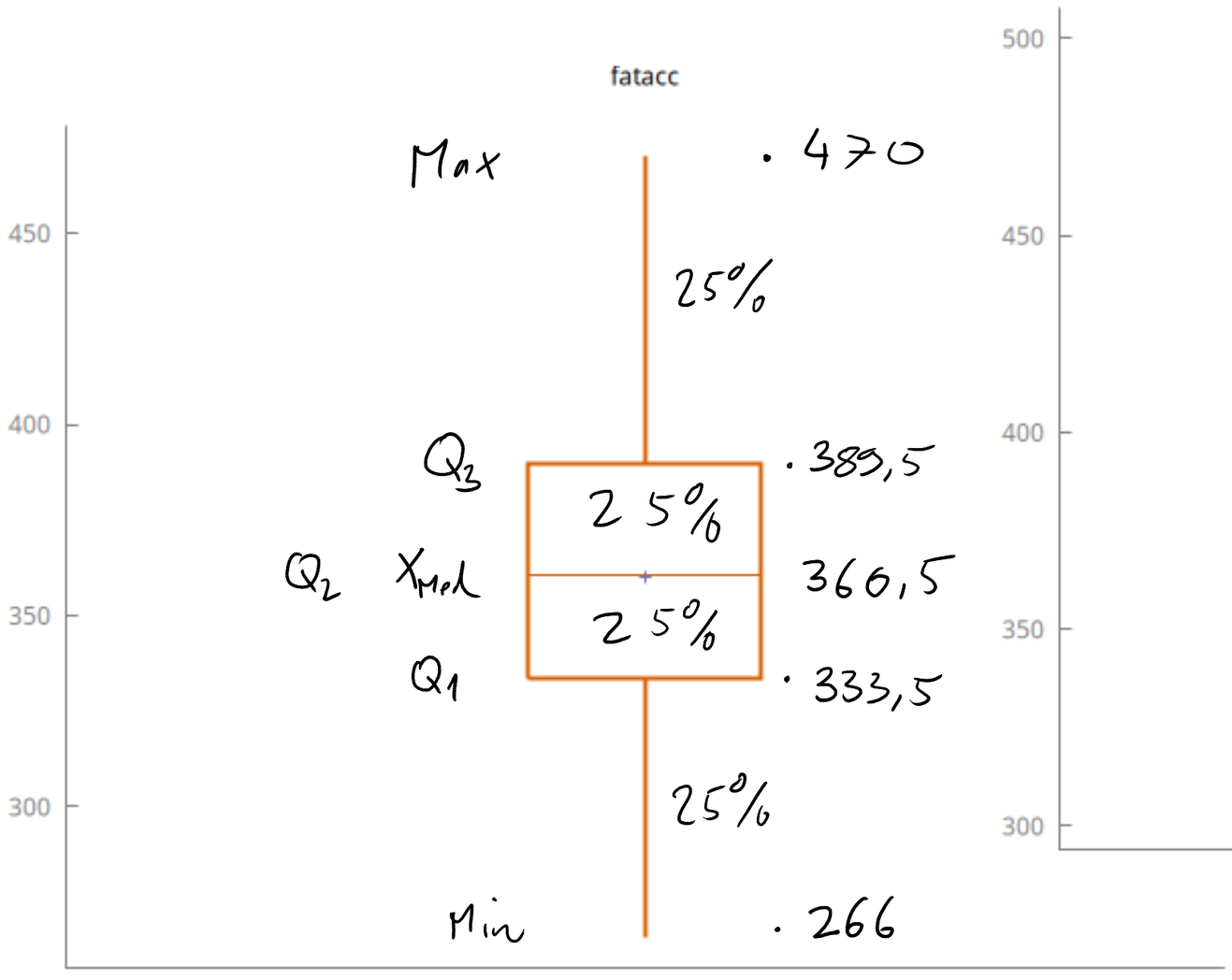
Ökonometrie Übung 1 Blatt 1 21.4.26

Aufgabe 1

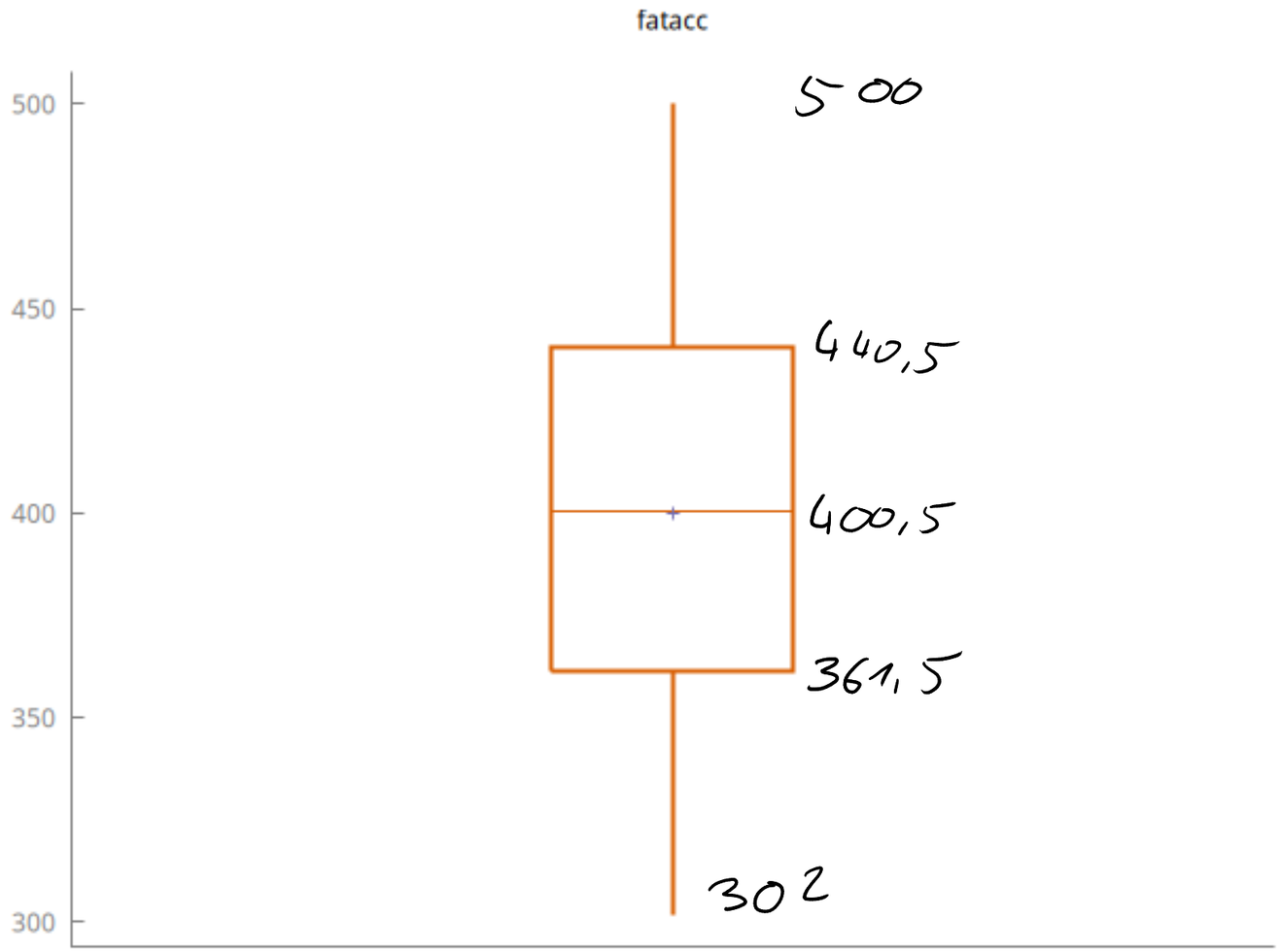
a)

	1981 - 1985	1986 - 1989
$\bar{x}$	360,18	400,12
x_{med}	360,50	400,50
σ	42,086	47,296

1981 - 1985

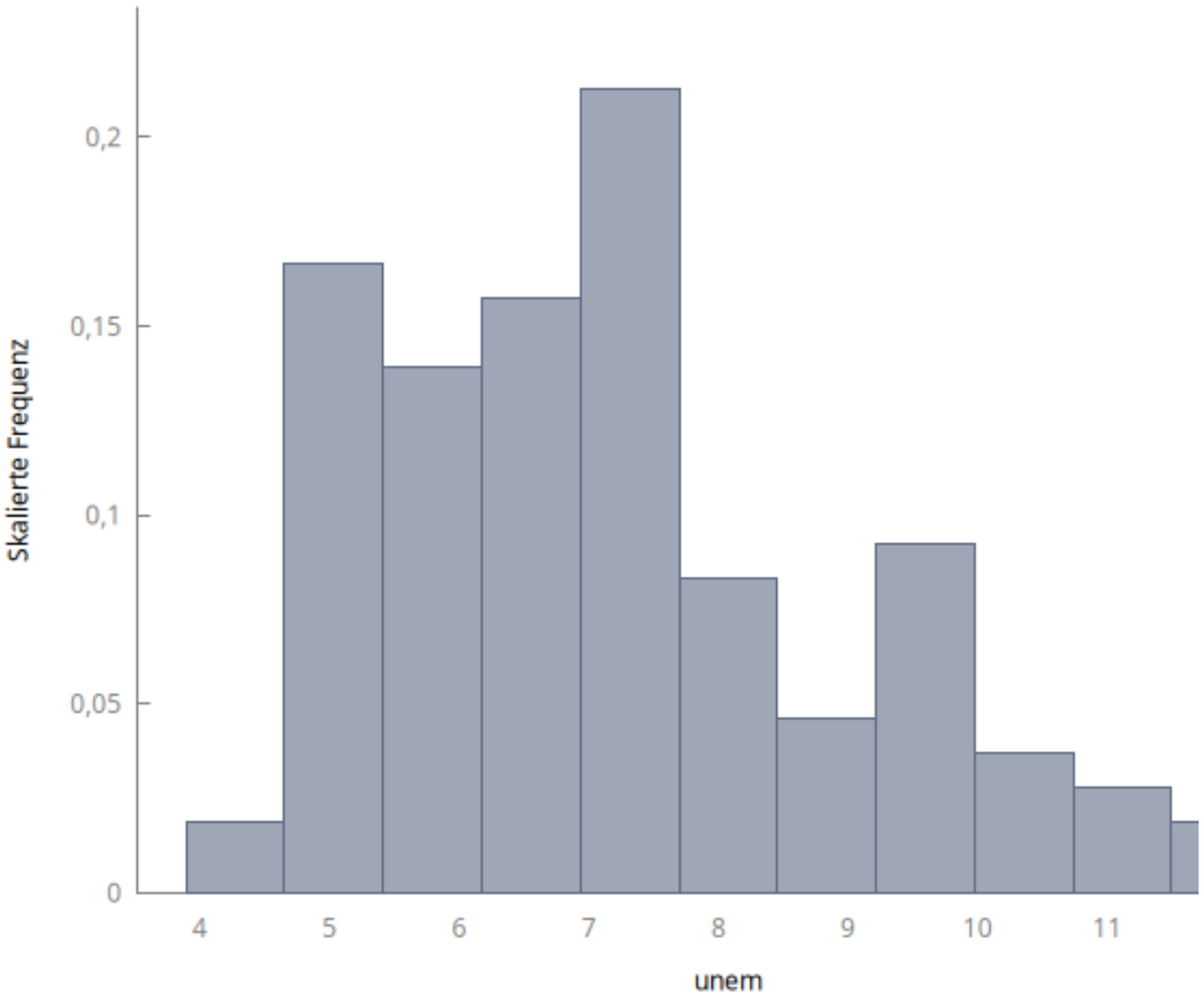


1986 - 1989

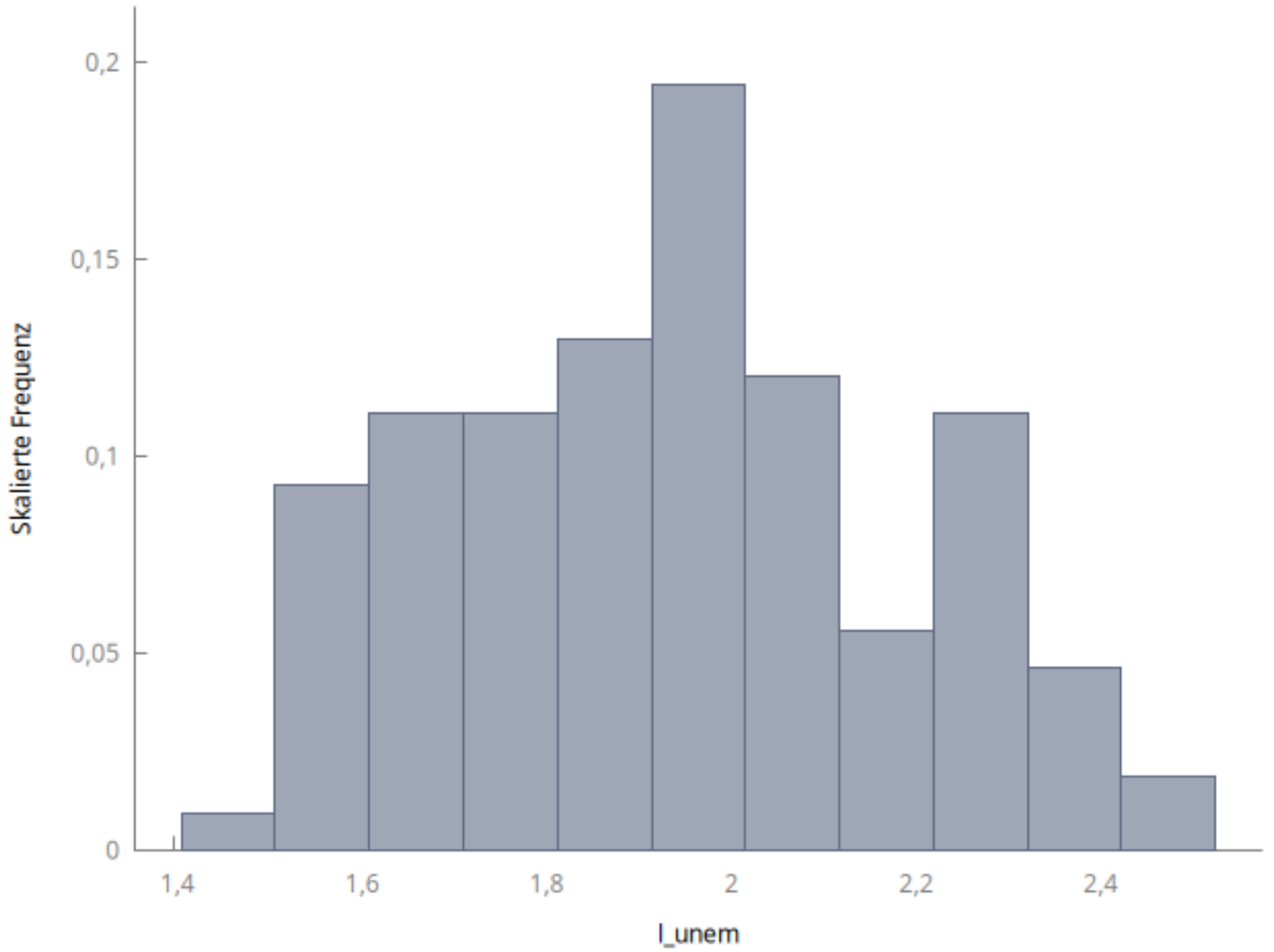


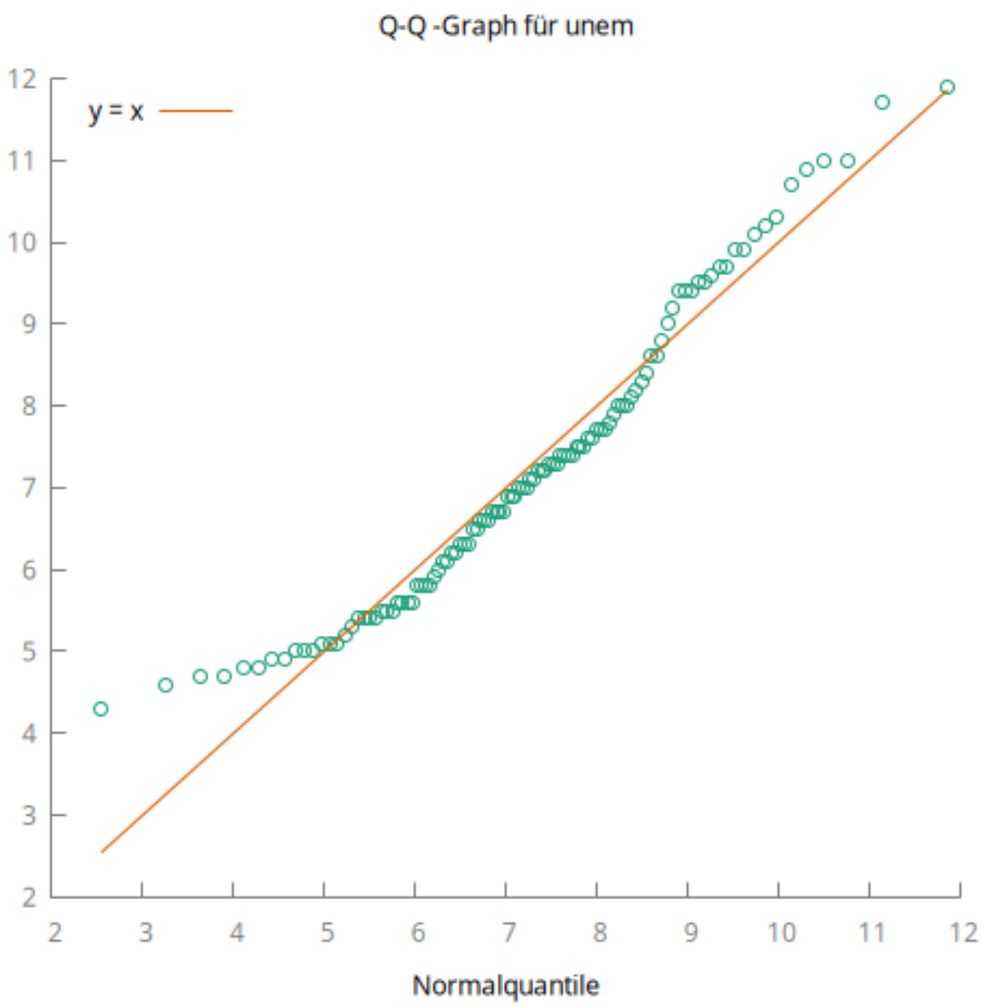
16)

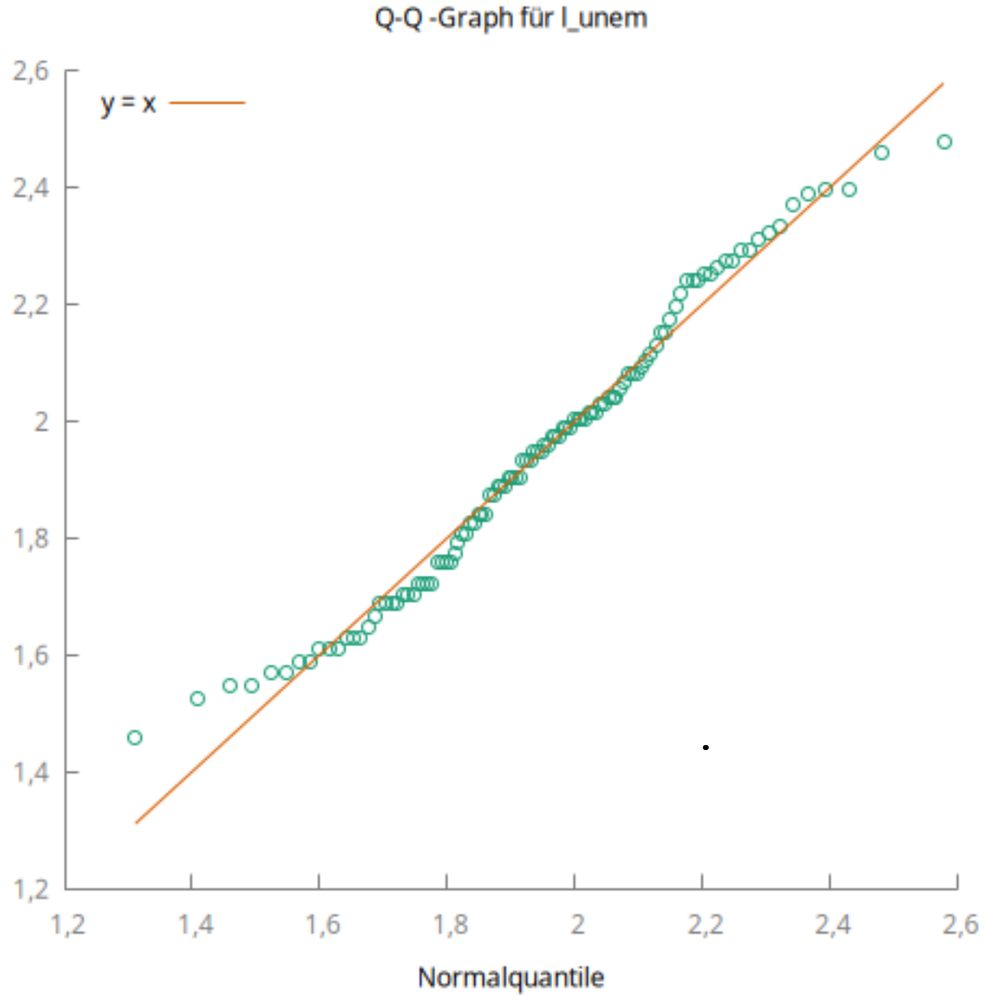
unem



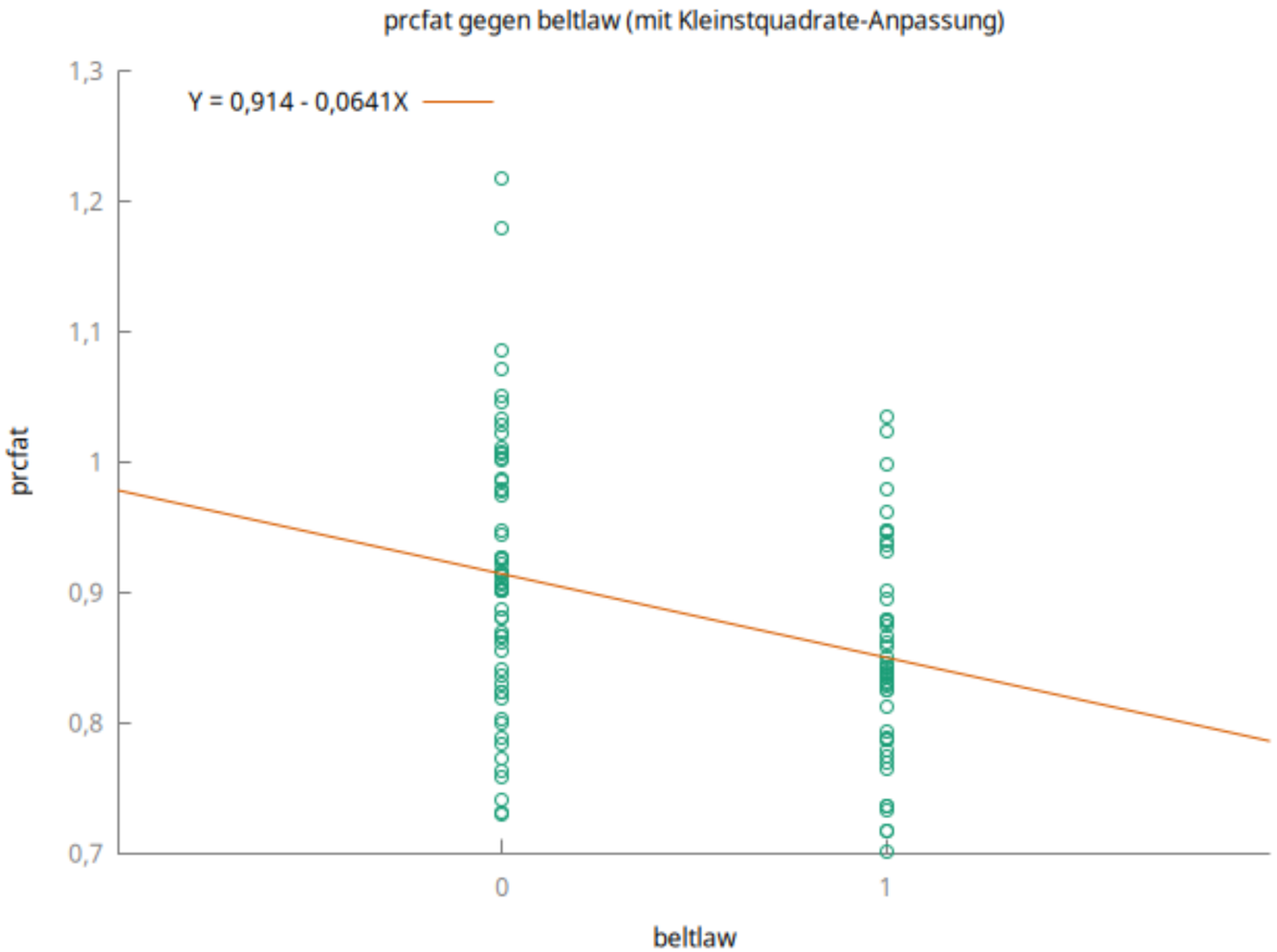
log(unem)




Q-Q -Graph für unem
y = x
12
11
10
9
8
7
6
5
4
3
2
2
3
4
5
6
7
8
9
10
11
12
Normalquantile


Q-Q -Graph für l_unem
y = x
2,6
2,4
2,2
2
1,8
1,6
1,4
1,2
1,2
1,4
1,6
1,8
2
2,2
2,4
2,6
Normalquantile

1 C


prcfat gegen beltlaw (mit Kleinstquadrate-Anpassung)
Y = 0,914 - 0,0641X
prcfat
1,3
1,2
1,1
1
0,9
0,8
0,7
0
1
beltlaw

Aufgabe 2

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

μ ← $E[X]$

$$Y = 4X + 7$$

Rechenregeln für Erwartungswerte

$$E[mX + b] = E[mX] + E[b] = mE[X] + b$$

Feste Parameter

Zufallsvariable

$$E[Y] = E[4X + 7] = 4E[X] + 7 = 4 \cdot \mu + 7$$

Varianz

$$Var(X) = E[(X - E[X])^2]$$

Varianz

$$Var(X) = E[(X - E[X])^2] = \sigma^2$$

$$Var(y) = E[(Y - E[Y])^2]$$

$$= E[(4X + 7 - 4\mu - 7)^2]$$

$$= E[(4X - 4\mu)^2]$$

$$= E[16(X - \mu)^2]$$

$$= 16\, E[(X - \mu)^2] = 16 \cdot \sigma^2$$

$E[X]$

$Var(X) = \sigma^2$

allgemein:

$$Var(mX + b) = m^2 Var(X)$$

Aufgabe 3 a)

Diskrete Zufallsvariable: Werte abzählbar

Werte: $\{x_1, x_2, \dots, (x_k)\} = W$

Wahrscheinlichkeiten $\{p_1, p_2, \dots, (p_4)\}$

$$p_i \geq 0 \quad i = 1 \dots 4$$

$$\sum_{i=1}^{k} p_i = 1$$

Erwartungswert

$$E[X] = \sum_{i=1}^{k} p_i \cdot x_i$$

$Y \subseteq W$, $\sum_{i : x_i \in Y} p_i > 0$

$$E[X|Y] = \sum_{i=1}^{k} p_{i|Y} \, x_i$$

$$p_{i|Y} = \frac{P(X = x_i \text{ und } X \in Y)}{P(X \in Y)}$$

38) Würfel

$$\sum_{i=1}^{n} i = \frac{n(n+1)}{2}$$

$$W = \{1, 2, \dots, 6\}$$

$$P_i = \frac{1}{6} \qquad i = 1, \dots, 6$$

$$E[X] = \frac{1}{6} \cdot 1 + \frac{1}{6} \cdot 2 + \dots + \frac{1}{6} \cdot 6$$

$$= \frac{1}{6}(1 + 2 + \dots + 6) = \frac{1}{6} \cdot \frac{6 \cdot 7}{2} = \frac{7}{2} = 3{,}5$$

$$Y = \{1, \dots, m\} \qquad 1 \le m \le 6$$

$$P_{i|Y} = \frac{P(X = x_i \text{ und } X \in Y)}{P(X \in Y)} = \begin{cases} \frac{1/6}{m/6} = \frac{1}{m} & i \le m \\ \frac{0}{m/6} & i > m \end{cases}$$

$$P(X \in Y) = \frac{m}{6}$$

$$E[X \mid X \le m] = \frac{1}{m}1 + \frac{1}{m}\cdot 2 + \cdots + \frac{1}{m}\cdot m$$

$$= \frac{1+m}{2}$$

Aufgabe 4 950, 940, 1025, 800, 975, 1000, 875, 990, 915, 1030.
x_1 x_2 x_3 x_{10}

Stichprobenumfang $n = 10$

$X \sim N(\mu, 250)$

$H_0 \quad \mu_0 = 1000$

Gauß-Test

Lehne H_0 ab (zu 1%)

da $|T| >$ Crit $\approx 2{,}57$

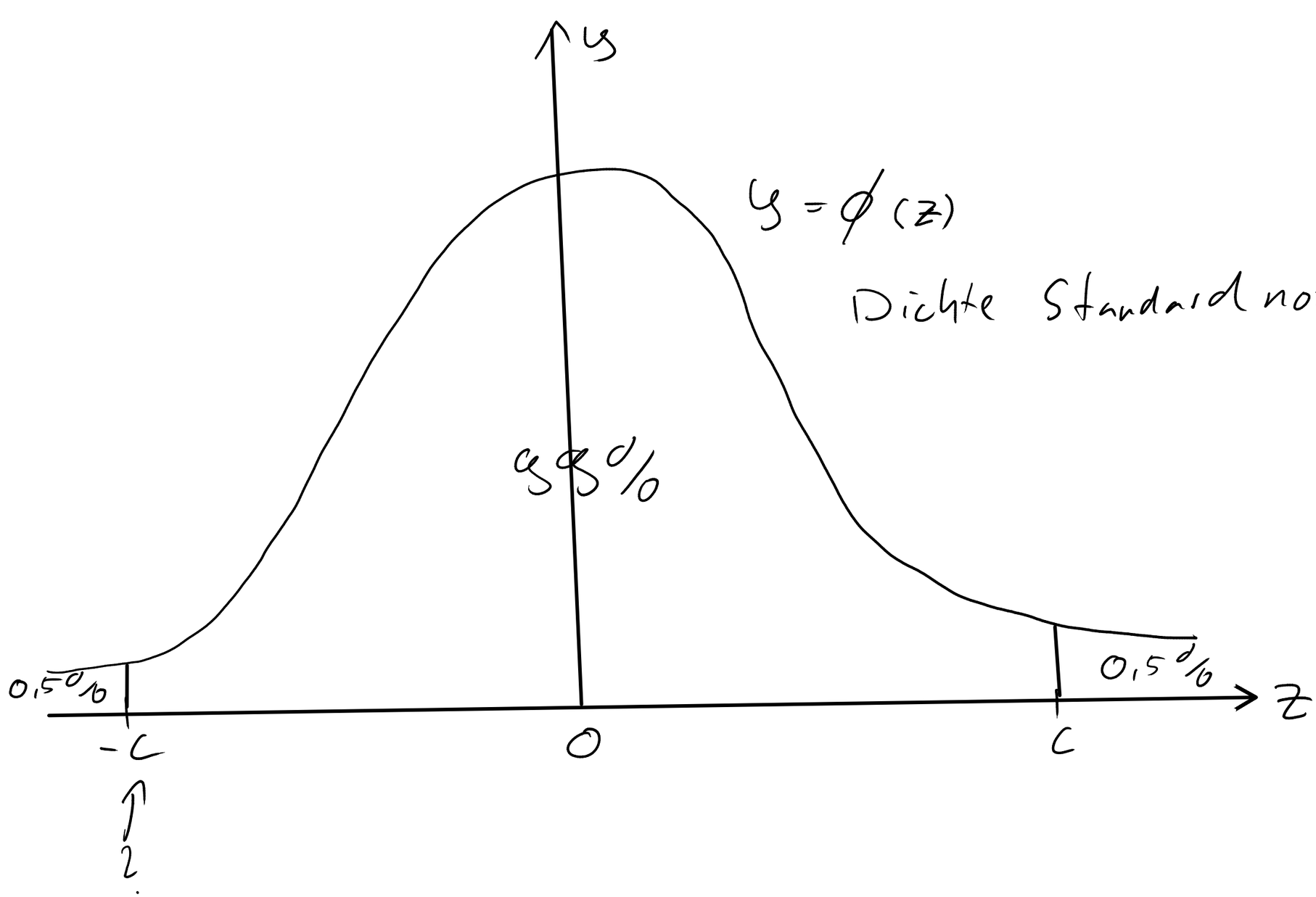
$$T = \frac{\bar{x} - \mu_0}{\frac{\sqrt{\mathrm{Var}(X)}/\sqrt{n}}{\sqrt{\mathrm{Var}(\bar{X})}}} = \frac{\bar{x} - 1000}{\sqrt{250}/\sqrt{10}} = \frac{950-1000}{\sqrt{25}} = \frac{-50}{5} = -10$$

950
940
1025
800
975
1000
875
990
915
1030

6 4 2

9500

$\Rightarrow \bar{X} = 950$



Dichte Standard normal verf.

$P(X \leq -c) = 0{,}5\,\%$