13.2 Sample Data 12.11. Sortiert:

9	11	13	14	15	15	16	19	21	23
23	23	23	24	24	25	28	28	29	31
33	33	34	34	34	35	35	36	36	38
39	42	45							

a 10-percentile $1 + 33 * 0.1 = 4\text{th} \rightarrow \underline{14}$

90-percentile $1 + 33 * 0.9 = 30\text{th} \rightarrow \underline{38}$

b Mean of disk I/Os: $\bar{x} = \underline{26.91} = \frac{1}{33} \sum_i x_i$

c 90% Confidence Interval for the mean: (90% sicherheit, dass mean innerhalb des Intervals)

$$\rightarrow \left(\bar{x} - z_{1-\alpha/2}\, s/\sqrt{n},\ \bar{x} + z_{1-\alpha/2}\, s/\sqrt{n}\right)$$

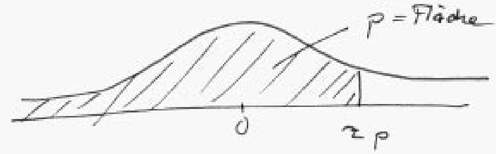
$$s = \text{Standardabweichung} = \sqrt{\frac{1}{n-1} \sum (x_i - \bar{x})^2} = \sigma = 9.58$$

$$\rightarrow \left(26.91 \pm (1.645) \cdot \frac{9.58}{\sqrt{33}}\right) = \underline{\underline{(24.19,\ 29.62)}}$$

[$z_{1-\alpha/2} = (1-\alpha/2)$-quantile $\Rightarrow$ 90% Conf $\rightarrow \alpha = 0.10$

$\rightarrow$ Tabelle A.2 Buch

$p = 1 - \alpha/2 = 0.95 \rightarrow z_p \overset{Tab}{=} 1.645$



]

d Fraction of ≤25 IO Calls: $p = \frac{n_1}{n} = \frac{16}{33} = \underline{0.485}$

90% Conf. Interval for the fraction

$$\rightarrow \left(p \mp z_{1-\alpha/2} \sqrt{\frac{p(1-p)}{n}}\right) = (0.485 \mp 1.645 \cdot 0.087)$$

$$= (0.342,\ 0.628)$$

(13.2) e One Sided 90% Conf. Interval for the mean

$\rightarrow \underset{=0.90}{1-\alpha}$ statt $\underset{=0.95}{1-\alpha/2} \rightarrow z_{1-\alpha} \overset{\text{Tab}}{=} 1.282$

$\rightarrow \left(\bar{x}, \bar{x} \pm z_{1-\alpha}\, S/\sqrt{n}\right) = \left(26.91, 26.91 \pm (1.282) \cdot \frac{9.58}{\sqrt{33}}\right)$

$= (26.91, 29.04)$ oder

$(24.77, 26.91)$

z.B. 90% Sicherheit, dass mean grösser als ein best. Wert

(14.4) Simple Linear Regression:

time $= b_0 + b_1 *$ (n days)

$b_1 = \dfrac{\sum xy - n\bar{x}\bar{y}}{\sum x^2 - n(\bar{x})^2} = 0.196$

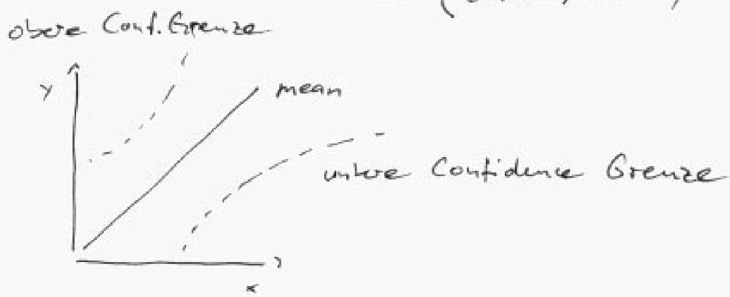
$b_0 = \bar{y} - b_1\bar{x} = 0.511$

$\rightarrow$ time $= \underline{0.511} + \underline{0.196} *$ n days

90% Conf Interval for regression coeffs.

$= (0.36, 0.66)$ for 0.511

$= (0.18, 0.21)$ for 0.196



(14.4) Standard Deviation of errors

$$S_e = \sqrt{\frac{\sum y^2 - b_0 \sum y - b_1 \sum xy}{n-2}}$$

Standard Deviation of the predicted mean of a large number of observations:

$$S_{\hat{y}p} = S_e \left[\frac{1}{n} + \frac{(x_p - \bar{x})^2}{\sum x^2 - n\bar{x}^2} \right]^{1/2}$$

$x_p \approx 100$ days $\rightarrow$ time ≈ 20

→ 90% Voraussage, dass 100 Tage 20 s dauern liegt zw. $\underbrace{18}_{0.18 \cdot 100 + 0.36}$ und $\underset{100 \cdot 0.21 + 0.66}{22}$

→ Mit 90% Sicherheit zw. 18 s u. 22 s