Lösungen / B2 S1 Ue1

1. Download Software

Link siehe Uebungsblatt

2. Download Skripts zu Software

Links siehe Uebungsblatt

3. a) Erst ein Programm zum Würfeln

Allgemeines

```
?Random
```

```
Random[ ] gives a uniformly distributed pseudorandom Real in the range
   0 to 1. Random[type, range] gives a pseudorandom number of the specified
   type, lying in the specified range. Possible types are: Integer, Real and
   Complex. The default range is 0 to 1. You can give the range {min, max}
   explicitly; a range specification of max is equivalent to {0, max}. Mehr...
```

```
Random[Integer, {1, 6}]
```

```
4
```

Beispiel: gewürfelte Tabelle - gewürfelte 3-er-Gruppen

```
Table[Random[Integer, {1, 6}], {n, 1, 20}]
```

```
{3, 6, 5, 1, 5, 3, 3, 2, 4, 1, 2, 3, 4, 5, 3, 5, 5, 4, 2, 6}
```

```
Table[Table[Random[Integer, {1, 6}], {n, 1, 3}], {m, 1, 20}]
```

```
{{3, 3, 6}, {1, 1, 6}, {4, 1, 2}, {2, 5, 4}, {5, 6, 5}, {5, 6, 6},
 {3, 1, 1}, {4, 4, 5}, {5, 5, 2}, {6, 6, 6}, {4, 3, 4}, {3, 3, 5}, {5, 3, 1},
 {4, 6, 6}, {2, 4, 3}, {3, 1, 5}, {1, 3, 5}, {2, 3, 2}, {1, 6, 1}, {2, 5, 3}}
```

```
Table[Table[Random[Integer, {1, 6}], {n, 1, 3}], {m, 1, 20}] // MatrixForm
```

$$\begin{pmatrix} 2 & 2 & 2 \\ 6 & 1 & 1 \\ 3 & 2 & 5 \\ 4 & 4 & 1 \\ 4 & 3 & 4 \\ 3 & 4 & 2 \\ 2 & 4 & 6 \\ 3 & 1 & 1 \\ 3 & 6 & 5 \\ 4 & 4 & 2 \\ 1 & 3 & 5 \\ 4 & 1 & 5 \\ 1 & 4 & 2 \\ 5 & 6 & 5 \\ 3 & 3 & 1 \\ 4 & 6 & 1 \\ 5 & 3 & 2 \\ 5 & 3 & 4 \\ 2 & 5 & 2 \\ 2 & 4 & 5 \end{pmatrix}$$

---

3. b) Lösungen

Run ganz rechts auf blaue linie klicken, Enter (mehrmals möglich!!!!!)

L = Lektion -- Sprechstunde

W = Work / Arbeit

A=Anhang/ Appendice

Notwendige Packages laden

```
<< Graphics`Graphics`
```

```
<< Statistics`DescriptiveStatistics`
```

Ueb 1

Kurs

Home page Rolf Wirz

rowicus.ch

Ueb 2 L / W

a Würfeln

Zufallszahlen:

```
p[x_] := Random[]; k[i_] := Round[5 {p[x], p[x], p[x], p[x], p[x]} + 1];
k[1]
```

{5, 2, 4, 1, 6}

```
k[1]
```

{5, 2, 3, 2, 2}

```
k[2]
```

{2, 2, 2, 1, 2}

Zahlen werden jedesmal neu generiert! Kann man das vermeiden?

```
u = k[2]
```

{2, 6, 4, 6, 3}

```
u = k[2]
```

{2, 3, 6, 6, 3}

```
u
```

{2, 3, 6, 6, 3}

```
u
```

{2, 3, 6, 6, 3}

```
u
```

{2, 3, 6, 6, 3}

```
k[2]
```

{2, 2, 5, 4, 3}

```
k[2]
```

{6, 4, 3, 2, 5}

```
u
```

{2, 3, 6, 6, 3}

```
u
```

{2, 3, 6, 6, 3}

```
k[3]
```

```
{3, 2, 2, 4, 1}
```

```
k[4]
```

```
{2, 4, 5, 4, 6}
```

Nun sollte es klar sein, wie es funktioniert.

{a,b,c,d,e}.{f,g,h,i,j} ist das Skalarprodukt

```
{a, b, c, d, e}.{1, 1, 1, 1, 1}
```

```
a + b + c + d + e
```

```
s[i_] := k[i].{1, 1, 1, 1, 1}; s[1]
```

```
20
```

```
s[2]
```

```
17
```

```
s[3]
```

```
19
```

```
tab = Table[s[i], {i, 50}]
```

```
{13, 13, 21, 17, 18, 19, 13, 21, 19, 13, 17, 26, 12, 19, 18,
 21, 14, 10, 19, 19, 18, 10, 21, 20, 15, 24, 21, 13, 13, 11, 17, 15,
 16, 18, 22, 19, 19, 19, 18, 20, 14, 18, 21, 15, 24, 19, 14, 11, 19, 20}
```

```
tab
```

```
{13, 13, 21, 17, 18, 19, 13, 21, 19, 13, 17, 26, 12, 19, 18,
 21, 14, 10, 19, 19, 18, 10, 21, 20, 15, 24, 21, 13, 13, 11, 17, 15,
 16, 18, 22, 19, 19, 19, 18, 20, 14, 18, 21, 15, 24, 19, 14, 11, 19, 20}
```

```
tab = Sort[tab]
```

```
{10, 10, 11, 11, 12, 13, 13, 13, 13, 13, 13, 14, 14, 14, 15,
 15, 15, 16, 17, 17, 17, 18, 18, 18, 18, 18, 18, 19, 19, 19, 19, 19,
 19, 19, 19, 19, 19, 20, 20, 20, 21, 21, 21, 21, 21, 21, 22, 24, 24, 26}
```

b Klassen

Klassen einteilen

```
Range[27]
```

```
{1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13,
 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27}
```

```
rg = Range[27] + 3
```

```
{4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16,
 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30}
```

```
rP = Partition[rg, 3]
```

```
{{4, 5, 6}, {7, 8, 9}, {10, 11, 12}, {13, 14, 15},
 {16, 17, 18}, {19, 20, 21}, {22, 23, 24}, {25, 26, 27}, {28, 29, 30}}
```

Klassenmitten

```
(Min[rP[[1]]] + Max[rP[[1]]]) / 2
```

```
5
```

```
rPMean = Table[(Min[rP[[i]]] + Max[rP[[i]]]) / 2, {i, 1, Length[rP]}]
```

```
{5, 8, 11, 14, 17, 20, 23, 26, 29}
```

Extreme Werte der 5. Klasse

```
Max[rP[[5]]]
```

```
18
```

```
Min[rP[[5]]]
```

```
16
```

Werte aus tab den Klassen zuordnen

```
Select[tab, (Min[rP[[5]]] < #1 < Max[rP[[5]]]) &]
```

```
{17, 17, 17}
```

```
freq = Table[Select[tab, (Min[rP[[i]]] - 1 < #1 < Max[rP[[i]]] + 1) &], {i, 1, Length[rP]}]
```

```
{{}, {}, {10, 10, 11, 11, 12}, {13, 13, 13, 13, 13, 13, 14, 14, 14, 15, 15, 15},
 {16, 17, 17, 17, 18, 18, 18, 18, 18, 18}, {19, 19, 19, 19, 19, 19, 19,
  19, 19, 19, 20, 20, 20, 21, 21, 21, 21, 21, 21}, {22, 24, 24}, {26}, {}}
```

Werte durch Klassenmittelwerte ersetzen

```
freq1 = Table[Table[rPMean[[i]], {k, 1, Length[freq[[i]]]}], {i, 1, Length[rP]}]
```

```
{{}, {}, {11, 11, 11, 11, 11}, {14, 14, 14, 14, 14, 14, 14, 14, 14, 14, 14, 14},
 {17, 17, 17, 17, 17, 17, 17, 17, 17, 17}, {20, 20, 20, 20, 20, 20, 20,
  20, 20, 20, 20, 20, 20, 20, 20, 20, 20, 20, 20}, {23, 23, 23}, {26}, {}}
```

Leere Klassen entfernen

```
freq2 = freq1 /. {} → missing
```

```
{missing, missing, {11, 11, 11, 11, 11},
 {14, 14, 14, 14, 14, 14, 14, 14, 14, 14, 14, 14}, {17, 17, 17, 17, 17, 17, 17, 17, 17, 17},
 {20, 20, 20, 20, 20, 20, 20, 20, 20, 20, 20, 20, 20, 20, 20, 20, 20, 20, 20},
 {23, 23, 23}, {26}, missing}
```

```
freq3 = DeleteCases[freq2, missing]
```

```
{{11, 11, 11, 11, 11}, {14, 14, 14, 14, 14, 14, 14, 14, 14, 14, 14, 14},
 {17, 17, 17, 17, 17, 17, 17, 17, 17, 17}, {20, 20, 20, 20, 20, 20, 20,
  20, 20, 20, 20, 20, 20, 20, 20, 20, 20, 20}, {23, 23, 23}, {26}}
```

File flach machen

```
freq4 = Flatten[freq3]
```

```
{11, 11, 11, 11, 11, 14, 14, 14, 14, 14, 14, 14, 14, 14, 14,
 14, 14, 17, 17, 17, 17, 17, 17, 17, 17, 17, 17, 20, 20, 20, 20, 20,
 20, 20, 20, 20, 20, 20, 20, 20, 20, 20, 20, 20, 20, 20, 23, 23, 23, 26}
```

```
freq5 = Frequencies[freq4]
```

```
{{5, 11}, {12, 14}, {10, 17}, {19, 20}, {3, 23}, {1, 26}}
```

```
MatrixForm[freq5]
```

$$\begin{pmatrix} 5 & 11 \\ 12 & 14 \\ 10 & 17 \\ 19 & 20 \\ 3 & 23 \\ 1 & 26 \end{pmatrix}$$

```
Remove[x1, x2]
```

```
freq6 = freq5 /. {x1_, x2_} → {x2, x1}
```

```
{{11, 5}, {14, 12}, {17, 10}, {20, 19}, {23, 3}, {26, 1}}
```

```
MatrixForm[freq6]
```

$$\begin{pmatrix} 11 & 5 \\ 14 & 12 \\ 17 & 10 \\ 20 & 19 \\ 23 & 3 \\ 26 & 1 \end{pmatrix}$$

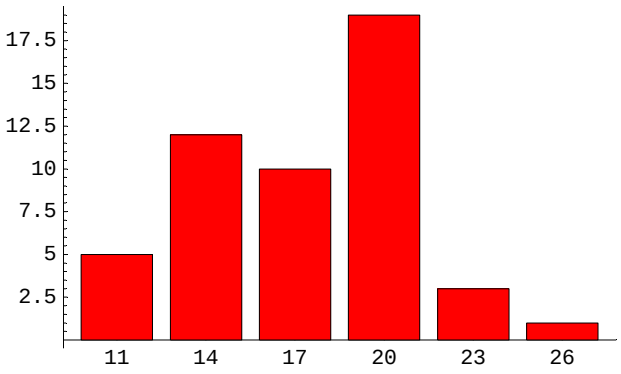
Namen anpassen

```
classes = freq4;
```

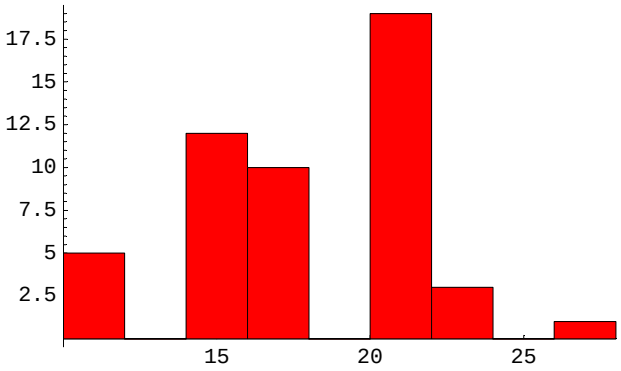
```
classes1 = freq5;
```

c Graphics

BarChart[classes1];



Histogram[classes];



d LocationReport

tab

```
{10, 10, 11, 11, 12, 13, 13, 13, 13, 13, 13, 14, 14, 14, 15,
 15, 15, 16, 17, 17, 17, 18, 18, 18, 18, 18, 18, 19, 19, 19, 19, 19,
 19, 19, 19, 19, 20, 20, 20, 21, 21, 21, 21, 21, 21, 22, 24, 24, 26}
```

freq4

```
{11, 11, 11, 11, 11, 14, 14, 14, 14, 14, 14, 14, 14, 14, 14,
 14, 14, 17, 17, 17, 17, 17, 17, 17, 17, 17, 17, 20, 20, 20, 20, 20,
 20, 20, 20, 20, 20, 20, 20, 20, 20, 20, 20, 20, 20, 20, 23, 23, 23, 26}
```

{Mean[tab], Mean[classes]} // N

```
{17.32, 17.36}
```

LocationReport[tab] // N

```
{Mean → 17.32, HarmonicMean → 16.4335, Median → 18.}
```

```
LocationReport[classes] // N
```

```
{Mean → 17.36, HarmonicMean → 16.5628, Median → 17.}
```

e DispersionReport

```
DispersionReport[tab] // N
```

```
{Variance → 14.2629, StandardDeviation → 3.77662, SampleRange → 16.,
 MeanDeviation → 3.1088, MedianDeviation → 3., QuartileDeviation → 3.}
```

```
DispersionReport[classes] // N
```

```
{Variance → 13.0922, StandardDeviation → 3.61832, SampleRange → 15.,
 MeanDeviation → 3.0288, MedianDeviation → 3., QuartileDeviation → 3.}
```