Probleme mit Frequenztabellen

```
In[11]:= Remove["Global`*"]
```

1 Aus einer Zählstatistik

Total der Klassen

```
In[12]:= (* m1 = Klassenmittenmenge; m2= Klassenfrequenzen; *)

         m1 = {145, 155, 165, 175, 185, 195, 205, 215, 225};
         m2 = {1, 4, 6, 10, 16, 14, 10, 7, 2};
         klassenTotal = m1 m2

Out[14]= {145, 620, 990, 1750, 2960, 2730, 2050, 1505, 450}
```

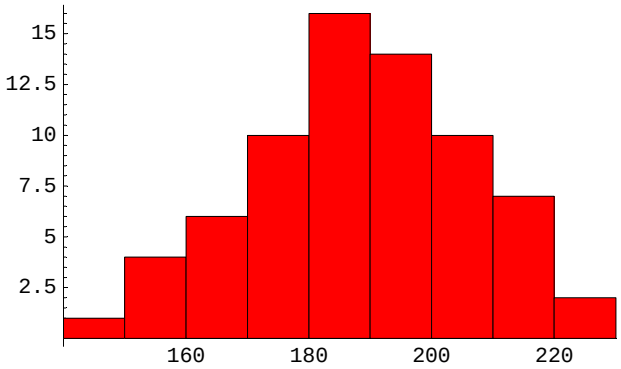
a Stichprobenumfang

```
In[15]:= tot = Apply[Plus, m2]

Out[15]= 70
```

b Histogramme, BarCharts, Plots

```
In[16]:= << Graphics`Graphics`

In[17]:= tab1 = Table[m1[[k]], {k, 1, Length[m2]}, {j, 1, m2[[k]]}]

Out[17]= {{145}, {155, 155, 155, 155}, {165, 165, 165, 165, 165, 165},
          {175, 175, 175, 175, 175, 175, 175, 175, 175, 175},
          {185, 185, 185, 185, 185, 185, 185, 185, 185, 185, 185, 185, 185, 185, 185, 185},
          {195, 195, 195, 195, 195, 195, 195, 195, 195, 195, 195, 195, 195, 195},
          {205, 205, 205, 205, 205, 205, 205, 205, 205, 205},
          {215, 215, 215, 215, 215, 215, 215}, {225, 225}}

In[18]:= tab2 = tab1 // Flatten

Out[18]= {145, 155, 155, 155, 155, 165, 165, 165, 165, 165, 165, 175, 175, 175,
          175, 175, 175, 175, 175, 175, 175, 185, 185, 185, 185, 185, 185, 185,
          185, 185, 185, 185, 185, 185, 185, 185, 185, 195, 195, 195, 195, 195,
          195, 195, 195, 195, 195, 195, 195, 195, 195, 205, 205, 205, 205, 205,
          205, 205, 205, 205, 205, 215, 215, 215, 215, 215, 215, 215, 225, 225}
```

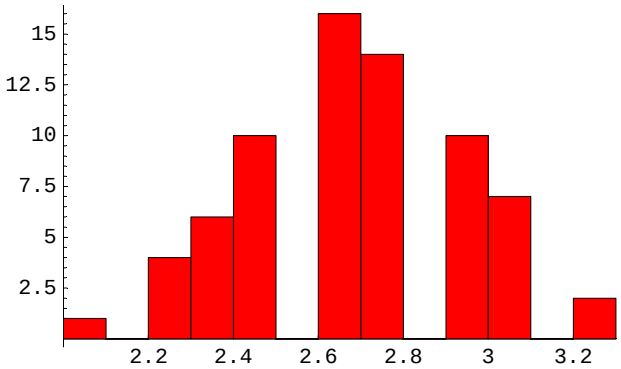
In[19]:=
```
Histogram[tab2 // Flatten];
```



In[20]:=
```
tab3 = tab2 / tot // N // Flatten
```

Out[20]=
```
{2.07143, 2.21429, 2.21429, 2.21429, 2.21429, 2.35714, 2.35714, 2.35714, 2.35714,
 2.35714, 2.35714, 2.5, 2.5, 2.5, 2.5, 2.5, 2.5, 2.5, 2.5, 2.5, 2.5, 2.64286,
 2.64286, 2.64286, 2.64286, 2.64286, 2.64286, 2.64286, 2.64286, 2.64286,
 2.64286, 2.64286, 2.64286, 2.64286, 2.64286, 2.64286, 2.64286, 2.78571,
 2.78571, 2.78571, 2.78571, 2.78571, 2.78571, 2.78571, 2.78571, 2.78571,
 2.78571, 2.78571, 2.78571, 2.78571, 2.78571, 2.92857, 2.92857, 2.92857,
 2.92857, 2.92857, 2.92857, 2.92857, 2.92857, 3.07143,
 3.07143, 3.07143, 3.07143, 3.07143, 3.07143, 3.07143, 3.21429, 3.21429}
```

In[21]:=
```
Histogram[tab3];
```

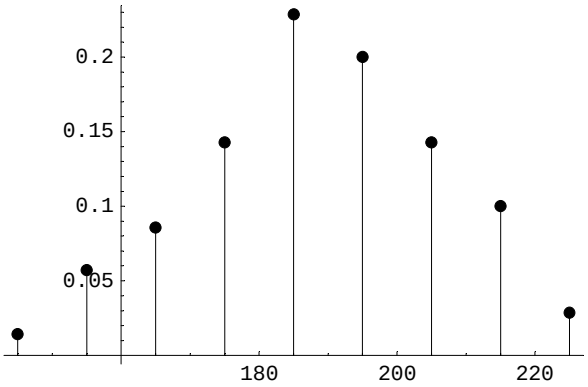


In[22]:=
```
<< Graphics`MultipleListPlot`
```

In[23]:=
```
m3 = Transpose[{m1, m2 / tot}]
```

Out[23]=
$$\left\{\left\{145, \frac{1}{70}\right\}, \left\{155, \frac{2}{35}\right\}, \left\{165, \frac{3}{35}\right\}, \left\{175, \frac{1}{7}\right\}, \left\{185, \frac{8}{35}\right\}, \left\{195, \frac{1}{5}\right\}, \left\{205, \frac{1}{7}\right\}, \left\{215, \frac{1}{10}\right\}, \left\{225, \frac{1}{35}\right\}\right\}$$

In[24]:=
```
MultipleListPlot[m3, SymbolShape → Stem];
```



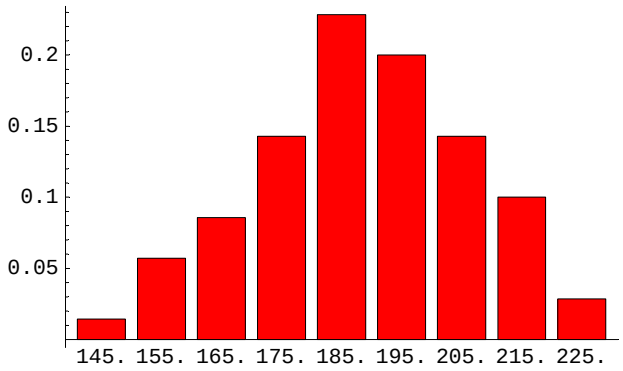
In[25]:=
```
m4 = Transpose[{m2 / tot, m1}]
```

Out[25]=
$$\left\{\left\{\frac{1}{70}, 145\right\}, \left\{\frac{2}{35}, 155\right\}, \left\{\frac{3}{35}, 165\right\}, \left\{\frac{1}{7}, 175\right\}, \left\{\frac{8}{35}, 185\right\}, \left\{\frac{1}{5}, 195\right\}, \left\{\frac{1}{7}, 205\right\}, \left\{\frac{1}{10}, 215\right\}, \left\{\frac{1}{35}, 225\right\}\right\}$$

In[26]:=
```
m4 = Transpose[{m2 / tot, m1}] // N
```

Out[26]=
```
{{0.0142857, 145.}, {0.0571429, 155.}, {0.0857143, 165.}, {0.142857, 175.},
 {0.228571, 185.}, {0.2, 195.}, {0.142857, 205.}, {0.1, 215.}, {0.0285714, 225.}}
```

In[27]:=
```
BarChart[m4];
```



c Summenhäufigkeit verbunden dargestellt

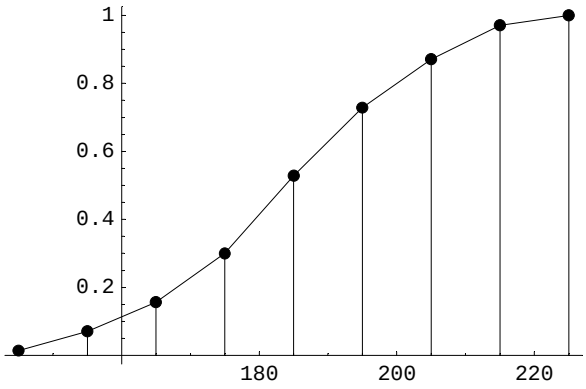
In[28]:=
```
sumh = Table[{m1[[k]], Sum[m2[[j]] / tot, {j, 1, k}]}, {k, 1, Length[m2]}]
```

Out[28]=
$$\left\{\left\{145, \frac{1}{70}\right\}, \left\{155, \frac{1}{14}\right\}, \left\{165, \frac{11}{70}\right\}, \left\{175, \frac{3}{10}\right\}, \left\{185, \frac{37}{70}\right\}, \left\{195, \frac{51}{70}\right\}, \left\{205, \frac{61}{70}\right\}, \left\{215, \frac{34}{35}\right\}, \{225, 1\}\right\}$$

In[29]:=
```
sumh // N
```

Out[29]=
```
{{145., 0.0142857}, {155., 0.0714286}, {165., 0.157143}, {175., 0.3},
 {185., 0.528571}, {195., 0.728571}, {205., 0.871429}, {215., 0.971429}, {225., 1.}}
```

```
In[30]:= MultipleListPlot[sumh // N, SymbolShape → Stem, PlotJoined → {True}];
```



{185., 0.528571} bedeutet, dass z.B. 52.8...% im Mittel einen Wert grösser als 180 und kleiner als 190 besitzen.

d Kenngrössen

```
In[31]:= << Statistics`DescriptiveStatistics`
```

```
In[32]:= Mean[tab2] // N
```

```
Out[32]= 188.571
```

```
In[33]:= LocationReport[tab2]
```

$$\text{Out[33]= } \left\{\text{Mean} \to \frac{1320}{7},\ \text{HarmonicMean} \to \frac{462272829393375}{2474601739304},\ \text{Median} \to 185\right\}$$

```
In[34]:= LocationReport[tab2] // N
```

```
Out[34]= {Mean → 188.571, HarmonicMean → 186.807, Median → 185.}
```

```
In[35]:= DispersionReport[tab2]
```

$$\text{Out[35]= } \left\{\text{Variance} \to \frac{52750}{161},\ \text{StandardDeviation} \to 5\sqrt{\frac{2110}{161}},\ \text{SampleRange} \to 80,\right.$$
$$\left.\text{MeanDeviation} \to \frac{717}{49},\ \text{MedianDeviation} \to 10,\ \text{QuartileDeviation} \to 15\right\}$$

```
In[36]:= DispersionReport[tab2] // N
```

```
Out[36]= {Variance → 327.64, StandardDeviation → 18.1008, SampleRange → 80.,
          MeanDeviation → 14.6327, MedianDeviation → 10., QuartileDeviation → 15.}
```

```
In[37]:= ShapeReport[tab2]
```

$$\text{Out[37]= } \left\{\text{Skewness} \to -\frac{4208}{1055\sqrt{633}},\ \text{QuartileSkewness} \to \frac{1}{3},\ \text{KurtosisExcess} \to -\frac{305038}{667815}\right\}$$

```
In[38]:= ShapeReport[tab2] // N
```

```
Out[38]= {Skewness → -0.158534, QuartileSkewness → 0.333333, KurtosisExcess → -0.45677}
```