Statistik Übung 4

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Hilfs-Funktionen

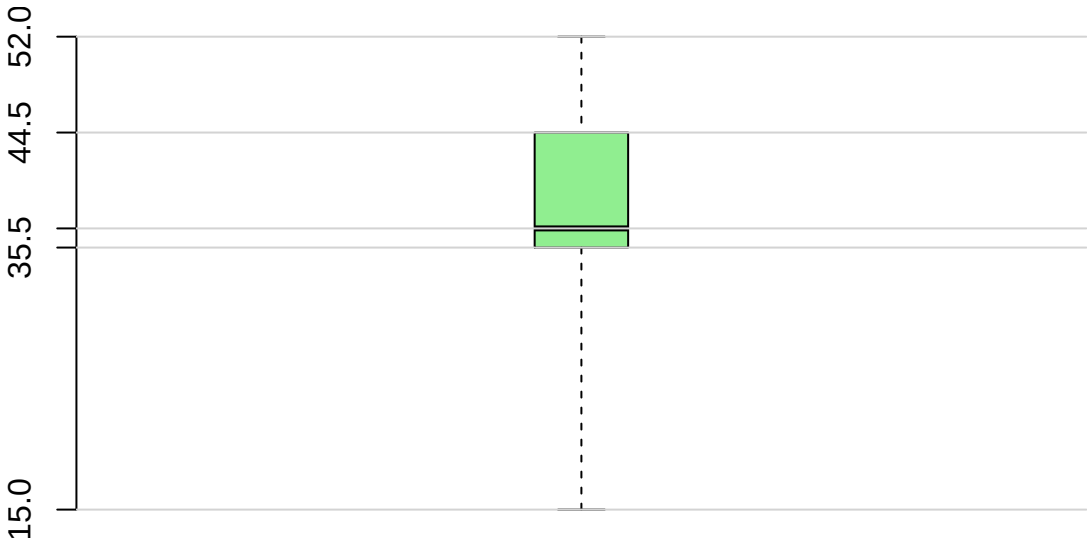
```
groupedQuantile <- function(breaks, distribution, p){
  distribution.cumsum <- cumsum(distribution)
  Np <- sum(distribution) * p

  for(i in 2:length(distribution.cumsum)) {
    if( distribution.cumsum[i-1] <= Np && distribution.cumsum[i] >= Np ){
      e <- breaks[i-1]
      d <- breaks[i] - breaks[i-1]
      f <- distribution[i]
      Fi <- distribution.cumsum[i-1]

      return(e + d / f * (Np - Fi))
    }
  }
}
```

Aufgabe 27

```
traveledDistance <- c(39, 35, 25, 37, 15, 36, 50, 52, 37, 51, 39)
traveledDistance.boxplot <- boxplot(traveledDistance, plot = FALSE, range = 0)
traveledDistance.plotvalues <- c(traveledDistance.boxplot$stats)
names(traveledDistance.plotvalues) <- c("Minimum", "p0.25", "Median", "p0.75", "Maximum")
traveledDistance.plotvalues
```

```
## Minimum   p0.25  Median   p0.75 Maximum
##    15.0    35.5    37.0    44.5    52.0
```

```
boxplot(traveledDistance, col="lightgreen", axes = FALSE, boxwex=0.2, range = 0)
axis(2, at = traveledDistance.plotvalues)
abline(h = traveledDistance.plotvalues, col = "lightgray")
```



Aufgabe 28

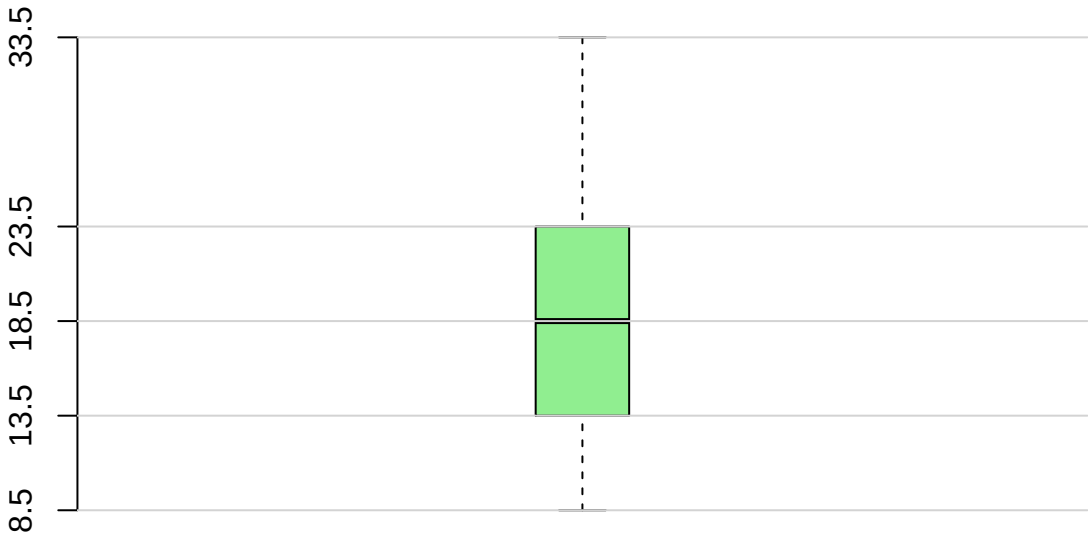
```
generic.breaks <- c(1, 6, 11, 16, 21, 26, 31, 36)
generic.breaks.length <- length(generic.breaks)
generic.c <- c(0, 4, 24, 40, 20, 4, 8)
generic.xi <- (generic.breaks[1:generic.breaks.length-1] + generic.breaks[2:generic.breaks.length]) / 2
generic.boxplot.data <- rep(generic.xi, times = generic.c)

generic.boxplot <- boxplot(generic.boxplot.data, plot = FALSE, range = 0)
generic.boxplot.stats <- c(generic.boxplot$stats)
names(generic.boxplot.stats) <- c("Minimum", "p0.25", "Median", "p0.75", "Maximum")

generic.xi
```

```
## [1]  3.5  8.5 13.5 18.5 23.5 28.5 33.5
```

```
generic.boxplot.stats
```

```
## Minimum   p0.25  Median   p0.75 Maximum
##     8.5    13.5    18.5    23.5    33.5
```

```
boxplot(generic.boxplot.data, col="lightgreen", axes = FALSE, boxwex=0.2, range = 0)
axis(2, at = generic.boxplot.stats)
abline(h = generic.boxplot.stats, col = "lightgray")
```



Aufgabe 29

```
rats.a <- c(99, 103, 106, 93, 98)
rats.b <- c(9.6, 10.2, 10.1, 9.7, 11.6)
rats.a.mean <- sum(rats.a) / length(rats.a)
rats.b.mean <- sum(rats.b) / length(rats.b)
rats.a.var <- sum((rats.a - rats.a.mean)^2) / length(rats.a)
rats.b.var <- sum((rats.b - rats.b.mean)^2) / length(rats.b)
rats.a.sd <- sqrt(rats.a.var)
rats.b.sd <- sqrt(rats.b.var)
rats.a.cv <- rats.a.sd / rats.a.mean
rats.b.cv <- rats.b.sd / rats.b.mean

names(rats.a.cv) <- c("Cv [%] for A")
names(rats.b.cv) <- c("Cv [%] for B")

c(rats.a.cv, rats.b.cv) * 100
```

```
## Cv [%] for A Cv [%] for B
##     4.454130     7.004071
```

Aufgabe 30

```
pupils.original <- rep(74, times = 28)
pupils.after <- c(rep(74, times = 27), 50)

pupils.result <- c(mean(pupils.original), mean(pupils.after))
pupils.result <- c(pupils.result,
                   round(pupils.result[2] / pupils.result[1] * 100, 2))
names(pupils.result) <- c("Davor", "Danach", "Änderung [%]")
```

Durchschnittsgewicht [kg]

```
pupils.result
```

```
##        Davor       Danach Änderung [%]
##     74.00000     73.14286     98.84000
```

Aufgabe 31

```
radio.breaks <- c(0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10)
radio.2000 <- c(5, 3, 10, 9, 13, 18, 21, 27, 10, 5)
radio.2018 <- c(35, 24 ,13, 8, 9, 4, 2, 0, 0, 2)
radio.xi <- (radio.breaks[1:length(radio.breaks)-1] +
               radio.breaks[2:length(radio.breaks)]) / 2
radio.2000.mean <- sum(radio.2000 * radio.xi) / sum(radio.2000)
radio.2018.mean <- sum(radio.2018 * radio.xi) / sum(radio.2018)

radio.2000.median <- groupedQuantile(radio.breaks, radio.2000, 0.5)
radio.2018.median <- groupedQuantile(radio.breaks, radio.2018, 0.5)

radio.data <- data.frame(
  "Radio 2000" = c("Mittelwert" = radio.2000.mean, "Median" = radio.2000.median),
  "Radio 2018" = c("Mittelwert" = radio.2018.mean, "Median" = radio.2018.median)
)

radio.data
```

```
##            Radio.2000 Radio.2018
## Mittelwert   5.723140   2.149485
## Median       5.119048   0.562500
```