boot_uebung1_team1

Sven Bergmann, Malte Lennartz

2023-03-30

Übung 1

A2

(i)

```
data("Forbes2000", package = "HSAUR2")
summary(Forbes2000)
```

```
##       rank             name                 country
##  Min.   :   1.0   Length:2000        United States :751
##  1st Qu.: 500.8   Class :character   Japan         :316
##  Median :1000.5   Mode  :character   United Kingdom:137
##  Mean   :1000.5                      Germany       : 65
##  3rd Qu.:1500.2                      France        : 63
##  Max.   :2000.0                      Canada        : 56
##                                      (Other)       :612
##                  category          sales            profits
##  Banking               : 313   Min.   :  0.010   Min.   :-25.8300
##  Diversified financials: 158   1st Qu.:  2.018   1st Qu.:  0.0800
##  Insurance             : 112   Median :  4.365   Median :  0.2000
##  Utilities             : 110   Mean   :  9.697   Mean   :  0.3811
##  Materials             :  97   3rd Qu.:  9.547   3rd Qu.:  0.4400
##  Oil & gas operations  :  90   Max.   :256.330   Max.   : 20.9600
##  (Other)               :1120                     NA's   :5
##      assets          marketvalue
##  Min.   :   0.270   Min.   :  0.02
##  1st Qu.:   4.025   1st Qu.:  2.72
##  Median :   9.345   Median :  5.15
##  Mean   :  34.042   Mean   : 11.88
##  3rd Qu.:  22.793   3rd Qu.: 10.60
##  Max.   :1264.030   Max.   :328.54
##
```

(ii)

```
class(Forbes2000)
```

```
## [1] "data.frame"
```

(iii)

```
attach(Forbes2000)
```

(iv)

```
head(Forbes2000,10)
```

```
##    rank               name        country                   category  sales
## 1     1          Citigroup  United States                    Banking  94.71
## 2     2   General Electric  United States               Conglomerates 134.19
## 3     3 American Intl Group  United States                   Insurance  76.66
## 4     4         ExxonMobil  United States  Oil & gas operations 222.88
## 5     5                 BP United Kingdom  Oil & gas operations 232.57
## 6     6    Bank of America  United States                    Banking  49.01
## 7     7         HSBC Group United Kingdom                    Banking  44.33
## 8     8       Toyota Motor          Japan     Consumer durables 135.82
## 9     9         Fannie Mae  United States Diversified financials  53.13
## 10   10    Wal-Mart Stores  United States                   Retailing 256.33
##    profits  assets marketvalue
## 1    17.85 1264.03      255.30
## 2    15.59  626.93      328.54
## 3     6.46  647.66      194.87
## 4    20.96  166.99      277.02
## 5    10.27  177.57      173.54
## 6    10.81  736.45      117.55
## 7     6.66  757.60      177.96
## 8     7.99  171.71      115.40
## 9     6.48 1019.17       76.84
## 10    9.05  104.91      243.74
```

(v)

```
summary(Forbes2000)
```

```
##      rank            name                    country
##  Min.   :   1.0   Length:2000        United States :751
##  1st Qu.: 500.8   Class :character   Japan         :316
##  Median :1000.5   Mode  :character   United Kingdom:137
##  Mean   :1000.5                      Germany       : 65
##  3rd Qu.:1500.2                      France        : 63
##  Max.   :2000.0                      Canada        : 56
##                                      (Other)       :612
##                   category          sales            profits
##  Banking              : 313   Min.   :  0.010   Min.   :-25.8300
##  Diversified financials: 158   1st Qu.:  2.018   1st Qu.:  0.0800
##  Insurance            : 112   Median :  4.365   Median :  0.2000
##  Utilities            : 110   Mean   :  9.697   Mean   :  0.3811
##  Materials            :  97   3rd Qu.:  9.547   3rd Qu.:  0.4400
##  Oil & gas operations :  90   Max.   :256.330   Max.   : 20.9600
##  (Other)              :1120                     NA's   :5
##      assets          marketvalue
##  Min.   :  0.270   Min.   :  0.02
##  1st Qu.:  4.025   1st Qu.:  2.72
```

```
## Median :    9.345   Median :  5.15
## Mean   :   34.042   Mean   : 11.88
## 3rd Qu.:   22.793   3rd Qu.: 10.60
## Max.   : 1264.030   Max.   :328.54
##
```

Interpretation: Eine "Zusammenfassung" der wichtigsten Daten des Datensatzes.

(vi)

```
write.table(Forbes2000, file="Forbes2000")
```

A3

(i)

```
median(Forbes2000[Forbes2000$country=='United States',]$profits, na.rm=TRUE)
```

```
## [1] 0.24
```

```
median(Forbes2000[Forbes2000$country=='United Kingdom',]$profits, na.rm=TRUE)
```

```
## [1] 0.205
```

```
median(Forbes2000[Forbes2000$country=='France',]$profits, na.rm=TRUE)
```

```
## [1] 0.19
```

```
median(Forbes2000[Forbes2000$country=='Germany',]$profits, na.rm=TRUE)
```

```
## [1] 0.23
```

(ii)

```
Forbes2000[Forbes2000$profits<0 & Forbes2000$country=='Germany',]
```

```
##       rank                   name country                      category sales
## 350    350       Allianz Worldwide Germany                     Insurance 96.88
## 364    364        Deutsche Telekom Germany Telecommunications services 56.40
## 397    397                    E.ON Germany                     Utilities 37.95
## 431    431      HVB-HypoVereinsbank Germany                       Banking 40.52
## 500    500             Commerzbank Germany                       Banking 22.43
## 798    798    Infineon Technologies Germany               Semiconductors  7.18
## 869    869             BHW Holding Germany        Diversified financials  7.46
## 926    926 Bankgesellschaft Berlin Germany                       Banking  9.43
## 1034  1034            W&W-Wustenrot Germany        Diversified financials  7.57
## 1187  1187           mg technologies Germany                     Chemicals  8.54
## 1477  1477  Nurnberger Beteiligungs Germany                     Insurance  3.00
## 1887  1887             SPAR Handels Germany                  Food markets  6.84
## 1994  1994                 Mobilcom Germany Telecommunications services  2.16
##      profits assets marketvalue
## 350    -1.23 851.24       48.07
## 364   -25.83 132.01       84.18
## 397    -0.73 115.57       43.96
## 431    -0.87 705.36       14.49
## 500    -0.31 437.86       11.00
## 798    -0.51  11.79       10.73
```

3

```
## 869     -0.38 117.96        2.98
## 926     -0.74 182.69        2.30
## 1034    -0.08  56.44        1.89
## 1187    -0.13   6.45        3.18
## 1477    -0.03  15.97        0.93
## 1887    -0.40   1.64        0.40
## 1994    -3.62   8.67        1.42
```

(iii)

```
Forbes2000[Forbes2000$country=='Bermunda',]$category
```

```
## factor(0)
## 27 Levels: Aerospace & defense Banking ... Utilities
```

(iv)

```
for (country in unique(Forbes2000$country)) {
  print(country)
  print(median(Forbes2000[Forbes2000$country==country,]$sales, na.rm=TRUE))
}
```

```
## [1] "United States"
## [1] 4.35
## [1] "United Kingdom"
## [1] 5.27
## [1] "Japan"
## [1] 4.55
## [1] "Switzerland"
## [1] 5.535
## [1] "Netherlands"
## [1] 8.185
## [1] "Netherlands/ United Kingdom"
## [1] 92.1
## [1] "France"
## [1] 11.04
## [1] "Germany"
## [1] 8.84
## [1] "Italy"
## [1] 3.95
## [1] "Spain"
## [1] 4.64
## [1] "South Korea"
## [1] 4.72
## [1] "China"
## [1] 2.18
## [1] "Bermuda"
## [1] 3.84
## [1] "Canada"
## [1] 4.175
## [1] "Finland"
## [1] 6.9
## [1] "Australia"
## [1] 3.19
```

```
## [1] "Russia"
## [1] 5.165
## [1] "Belgium"
## [1] 7.34
## [1] "Kong/China"
## [1] 2.945
## [1] "Norway"
## [1] 5.3
## [1] "Australia/ United Kingdom"
## [1] 11.595
## [1] "Brazil"
## [1] 4.15
## [1] "Denmark"
## [1] 4.79
## [1] "Sweden"
## [1] 6.315
## [1] "Hong Kong/China"
## [1] 0.985
## [1] "United Kingdom/ Australia"
## [1] 10.01
## [1] "Ireland"
## [1] 4.67
## [1] "India"
## [1] 1.59
## [1] "Panama/ United Kingdom"
## [1] 5.93
## [1] "Taiwan"
## [1] 2.2
## [1] "Singapore"
## [1] 2.81
## [1] "South Africa"
## [1] 4.69
## [1] "Austria"
## [1] 3.43
## [1] "Mexico"
## [1] 3.49
## [1] "Portugal"
## [1] 4.12
## [1] "Thailand"
## [1] 1.58
## [1] "Malaysia"
## [1] 1.19
## [1] "Turkey"
## [1] 4.355
## [1] "Greece"
## [1] 2.46
## [1] "Luxembourg"
## [1] 14.185
## [1] "Islands"
## [1] 6.67
## [1] "Liberia"
## [1] 3.78
## [1] "Indonesia"
## [1] 2.35
```

```
## [1] "Israel"
## [1] 2.17
## [1] "United Kingdom/ Netherlands"
## [1] 7.54
## [1] "New Zealand"
## [1] 2.64
## [1] "Africa"
## [1] 6.82
## [1] "Chile"
## [1] 1.205
## [1] "Jordan"
## [1] 1.33
## [1] "Hungary"
## [1] 3.37
## [1] "Korea"
## [1] 10.685
## [1] "Poland"
## [1] 4.41
## [1] "Cayman Islands"
## [1] 1.91
## [1] "Czech Republic"
## [1] 1.805
## [1] "Pakistan"
## [1] 1.23
## [1] "United Kingdom/ South Africa"
## [1] 2.06
## [1] "France/ United Kingdom"
## [1] 1.01
## [1] "Philippines"
## [1] 1.565
## [1] "Bahamas"
## [1] 1.35
## [1] "Venezuela"
## [1] 0.98
## [1] "Peru"
## [1] 0.17
```

(v)

```r
for (country in unique(Forbes2000$country)) {
  print(country)
  print(nrow(Forbes2000[Forbes2000$country==country & Forbes2000$profits >= 5 * 10^9,]))
}
```

```
## [1] "United States"
## [1] 3
## [1] "United Kingdom"
## [1] 1
## [1] "Japan"
## [1] 0
## [1] "Switzerland"
## [1] 0
## [1] "Netherlands"
## [1] 0
```

```
## [1] "Netherlands/ United Kingdom"
## [1] 0
## [1] "France"
## [1] 0
## [1] "Germany"
## [1] 0
## [1] "Italy"
## [1] 0
## [1] "Spain"
## [1] 0
## [1] "South Korea"
## [1] 0
## [1] "China"
## [1] 0
## [1] "Bermuda"
## [1] 0
## [1] "Canada"
## [1] 0
## [1] "Finland"
## [1] 0
## [1] "Australia"
## [1] 1
## [1] "Russia"
## [1] 0
## [1] "Belgium"
## [1] 0
## [1] "Kong/China"
## [1] 0
## [1] "Norway"
## [1] 0
## [1] "Australia/ United Kingdom"
## [1] 0
## [1] "Brazil"
## [1] 0
## [1] "Denmark"
## [1] 0
## [1] "Sweden"
## [1] 0
## [1] "Hong Kong/China"
## [1] 0
## [1] "United Kingdom/ Australia"
## [1] 0
## [1] "Ireland"
## [1] 0
## [1] "India"
## [1] 0
## [1] "Panama/ United Kingdom"
## [1] 0
## [1] "Taiwan"
## [1] 0
## [1] "Singapore"
## [1] 0
## [1] "South Africa"
## [1] 0
```

```
## [1] "Austria"
## [1] 0
## [1] "Mexico"
## [1] 0
## [1] "Portugal"
## [1] 0
## [1] "Thailand"
## [1] 0
## [1] "Malaysia"
## [1] 0
## [1] "Turkey"
## [1] 0
## [1] "Greece"
## [1] 0
## [1] "Luxembourg"
## [1] 0
## [1] "Islands"
## [1] 0
## [1] "Liberia"
## [1] 0
## [1] "Indonesia"
## [1] 0
## [1] "Israel"
## [1] 0
## [1] "United Kingdom/ Netherlands"
## [1] 0
## [1] "New Zealand"
## [1] 0
## [1] "Africa"
## [1] 0
## [1] "Chile"
## [1] 0
## [1] "Jordan"
## [1] 0
## [1] "Hungary"
## [1] 0
## [1] "Korea"
## [1] 0
## [1] "Poland"
## [1] 0
## [1] "Cayman Islands"
## [1] 0
## [1] "Czech Republic"
## [1] 0
## [1] "Pakistan"
## [1] 0
## [1] "United Kingdom/ South Africa"
## [1] 0
## [1] "France/ United Kingdom"
## [1] 0
## [1] "Philippines"
## [1] 0
## [1] "Bahamas"
## [1] 0
```
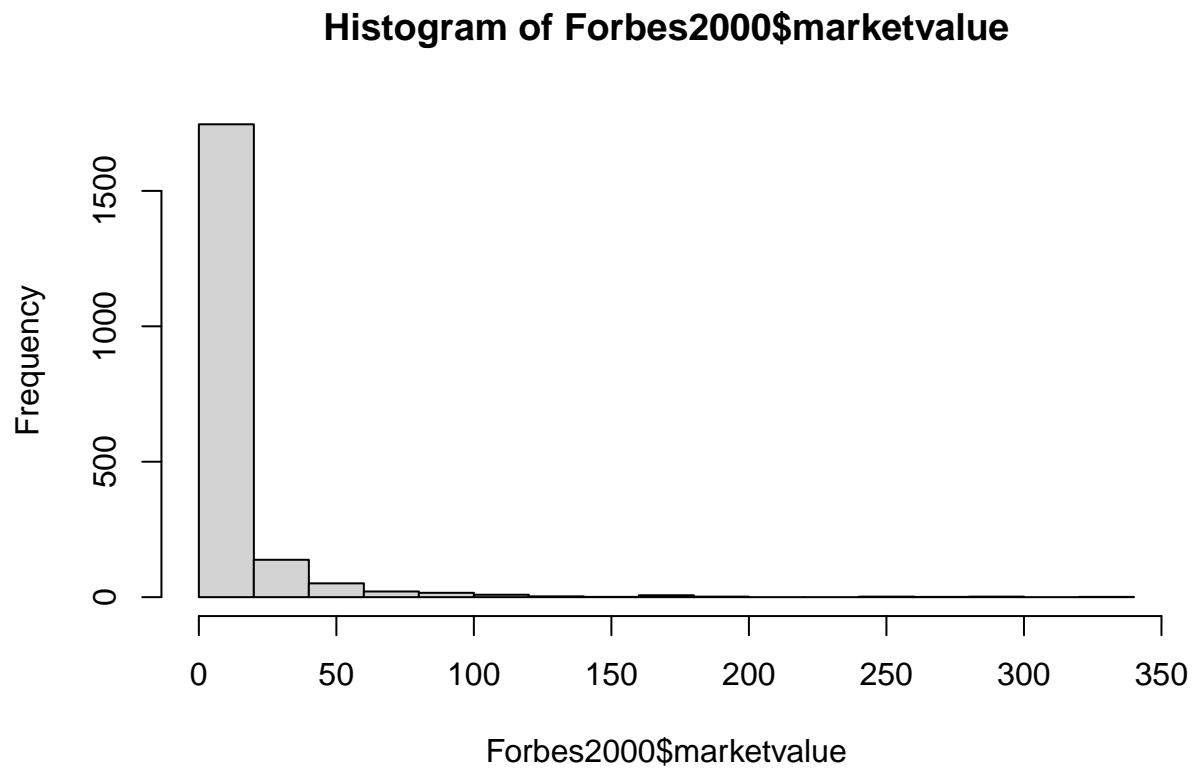
```
## [1] "Venezuela"
## [1] 0
## [1] "Peru"
## [1] 0
```
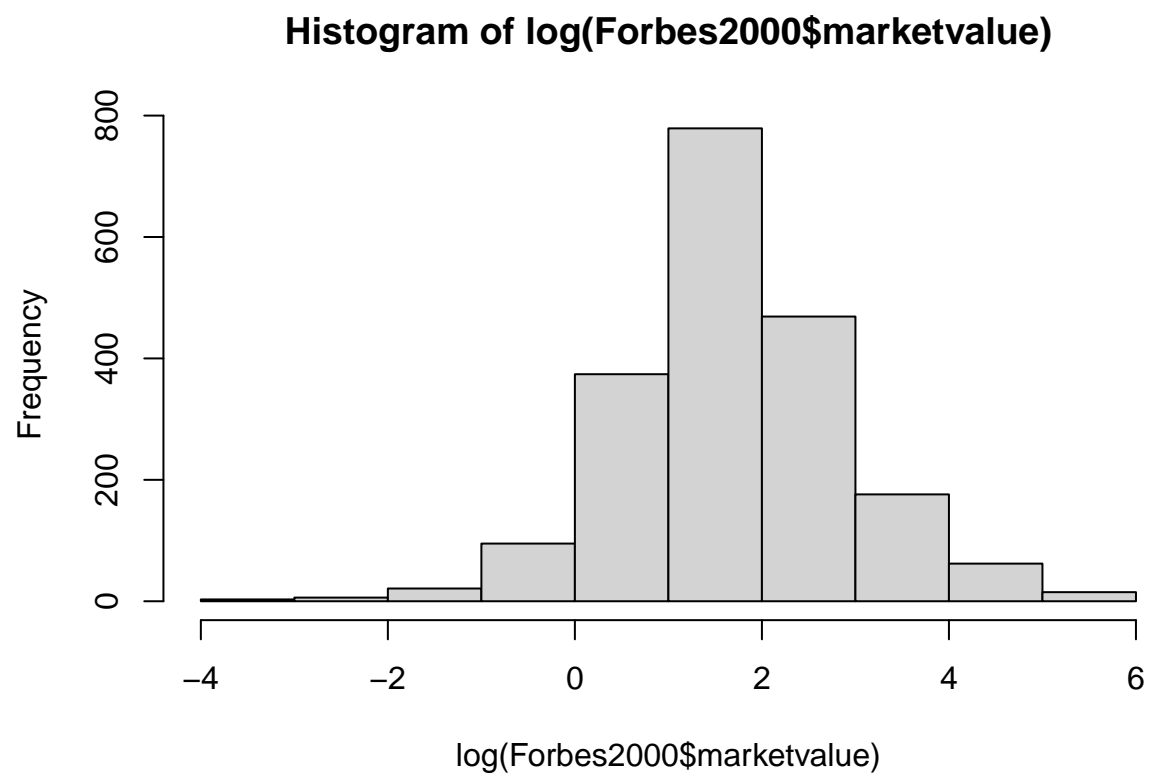
A4

(i)
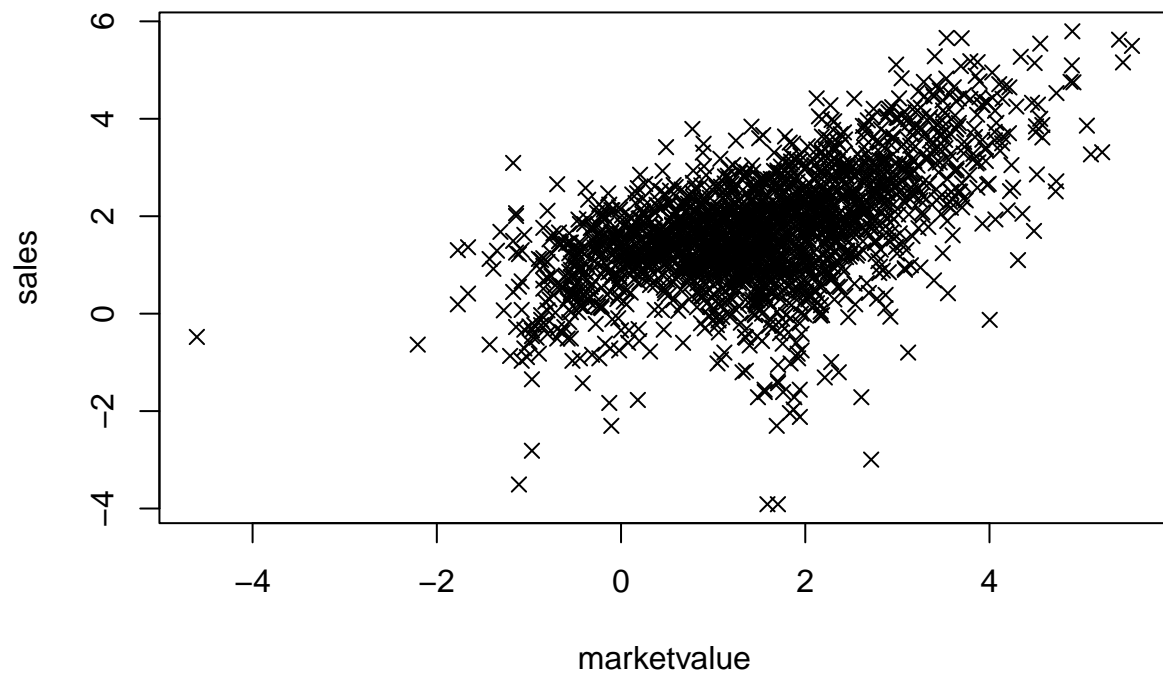
```
hist(Forbes2000$marketvalue)
```

Histogram of Forbes2000$marketvalue

```
hist(log(Forbes2000$marketvalue))
```

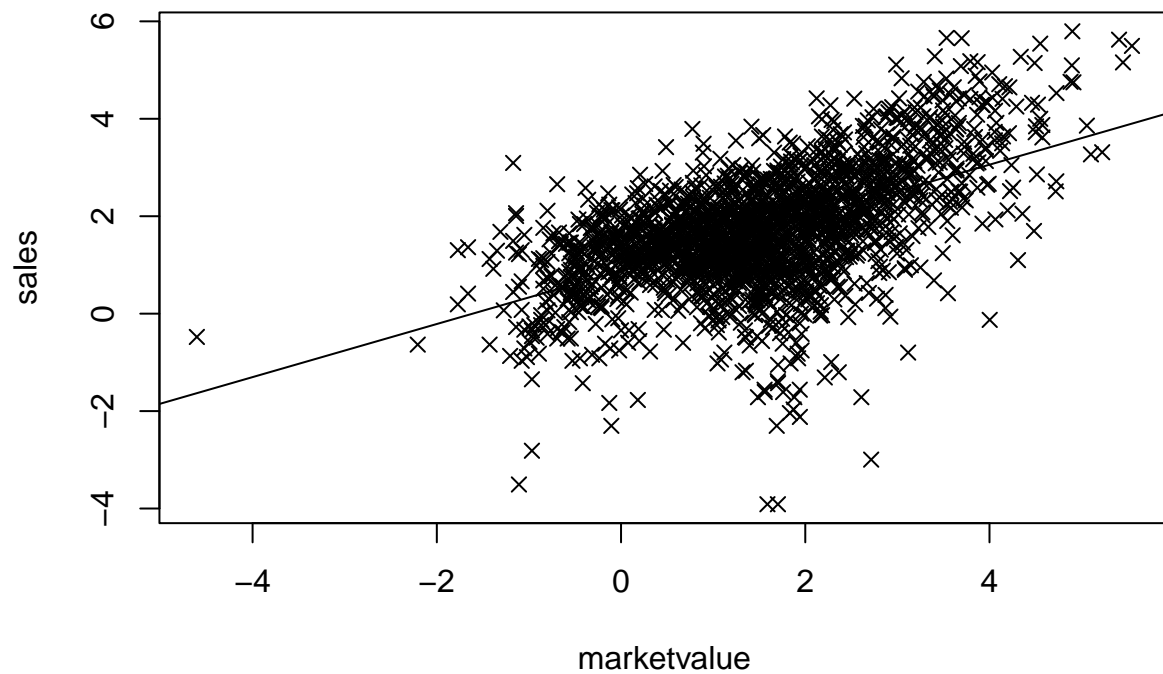## Histogram of log(Forbes2000$marketvalue)

(ii)

```
plot(log(marketvalue)~log(sales), data=Forbes2000, xlab="marketvalue", ylab="sales", pch=4)
```

(iii)

```
plot(log(marketvalue)~log(sales), data=Forbes2000, xlab="marketvalue", ylab="sales", pch=4)

abline(lm(log(marketvalue)~log(sales), Forbes2000))
```

A5

(i)

```
pnorm(3, mean = 0, sd = 1, lower.tail = FALSE)
```

```
## [1] 0.001349898
```

(ii)

```
pnorm(6, mean = 0, sd = 1, lower.tail = FALSE)
```

```
## [1] 9.865876e-10
```

(iii)

```
pbinom(10, size = 10, prob = 0.8)
```

```
## [1] 1
```

(iv)

```
pchisq(6.5, df=2, lower.tail = FALSE)
```

```
## [1] 0.03877421
```

A6