week4 exercise

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Exercise 1

Exercise 2

1

```
library(brolgar)
data(heights)
heights = as.data.frame(heights)
```

2

```
coun_hei = function(coun_name){
  all_coun = unique(heights$country)
  if (coun_name %in% all_coun){
    result = heights[heights$country == coun_name, ]
    return(result)
  } else {
    warning('No data are available for the requested country!!!\n')
  }
}
```

Test function in Question 2:

```
coun_hei('China')
```

```
##     country continent year height_cm
## 248   China      Asia 1810     165.7
## 249   China      Asia 1820     165.8
## 250   China      Asia 1830     165.8
## 251   China      Asia 1840     166.2
## 252   China      Asia 1850     166.2
## 253   China      Asia 1860     165.7
## 254   China      Asia 1870     165.8
## 255   China      Asia 1880     165.3
## 256   China      Asia 1890     164.0
```

```
## 257   China      Asia 1900     164.0
## 258   China      Asia 1910     164.7
## 259   China      Asia 1920     164.2
## 260   China      Asia 1930     166.5
## 261   China      Asia 1940     167.4
## 262   China      Asia 1950     169.2
## 263   China      Asia 1960     170.0
## 264   China      Asia 1970     170.0
## 265   China      Asia 1980     171.5
```

```
coun_hei('C')
```

```
## Warning in coun_hei("C"): No data are available for the requested country!!!
```

3

```
coun_hei1 = function(coun_name, min_year){
  all_coun = unique(heights$country)
  if (coun_name %in% all_coun){
    result = heights[(heights$country == coun_name) & (heights$year >= min_year), ]
    if (nrow(result) > 0) {
      return(result)
    } else {
      warning('No data are available for the requested min_year!!!\n')
    }
  } else {
    warning('No data are available for the requested country!!!\n')
  }
}
```

Test function in Question 3:

```
coun_hei1('China', 1930)
```

```
##     country continent year height_cm
## 260   China      Asia 1930     166.5
## 261   China      Asia 1940     167.4
## 262   China      Asia 1950     169.2
## 263   China      Asia 1960     170.0
## 264   China      Asia 1970     170.0
## 265   China      Asia 1980     171.5
```

```
coun_hei1('C', 1930)
```

```
## Warning in coun_hei1("C", 1930): No data are available for the requested country!!!
```

```
coun_hei1('China', 2000)
```

```
## Warning in coun_hei1("China", 2000): No data are available for the requested min_year!!!
```

```
coun_hei1('C', 2000)
```

```
## Warning in coun_hei1("C", 2000): No data are available for the requested country!!!
```

Exercise 3

1

```
f = function(x){
  if (x <= -3) {
    result = -5
  } else if ((x > -3) & (x < 1)) {
    result = log(x+5)
  } else if (x == 1) {
    result = 2
  } else if ((x > 1) & (x <= 14)) {
    result = (x+3)**(1/2)
  } else {
    result = log(x)
  }
  return(result)
}
```

2

```
f(-6)
```

```
## [1] -5
```

```
f(-4)
```

```
## [1] -5
```

```
f(-2)
```

```
## [1] 1.098612
```

```
f(0)
```

```
## [1] 1.609438
```

```
f(2)
```

```
## [1] 2.236068
```

```r
f(4)
```

```
## [1] 2.645751
```

```r
f(6)
```

```
## [1] 3
```

```r
f(8)
```

```
## [1] 3.316625
```

```r
f(10)
```

```
## [1] 3.605551
```

Exercise 4

1

```r
func1 = function(mat){
  if (nrow(mat) != ncol(mat)) {
    return('This matrix is not square')
  }
}
```

2

```r
func2 = function(mat){
  if (nrow(mat) != ncol(mat)) {
    return('This matrix is not square')
  } else {
    d_mat = det(mat)
    if (d_mat == 0) {
      return('This matrix is square and has determinant 0')
    } else {
      inv_mat = solve(mat)
      return(inv_mat)
    }
  }
}
```

Test func1 and func2:

```r
mat1 = matrix(1:8, nrow=2, ncol=4)
func1(mat1)
```

```
## [1] "This matrix is not square"
```

```r
func2(mat1)
```

```
## [1] "This matrix is not square"
```

```r
mat2 = matrix(1:9, nrow=3, ncol=3)
func1(mat2)
func2(mat2)
```

```
## [1] "This matrix is square and has determinant 0"
```

```r
mat3 = matrix(c(1, 0, 0, 1), nrow=2, ncol=2)
func1(mat3)
func2(mat3)
```

```
##      [,1] [,2]
## [1,]    1    0
## [2,]    0    1
```

Exercise 5

1

```r
func1 = function(df) {
  if ((nrow(df) < 5) & (ncol(df) < 5)) {
    print(df)
  }
}
```

2

```r
func2 = function(df) {
  if ((nrow(df) < 5) & (ncol(df) >= 5) & (ncol(df) <= 10)) {
    print(df[, (ncol(df)-4):ncol(df)])
  }
}
```

3

```
func3 = function(df) {
  if ((nrow(df) < 5) & (ncol(df) >= 10)) {
    print(df[, 1:5])
  }
}
```

4

```
func4 = function(df) {
  if ((nrow(df) >= 5) & (ncol(df) < 5)) {
    print(df[(nrow(df)-4):nrow(df), ])
  }
}
```

5

```
func5 = function(df) {
  if ((nrow(df) >= 5) & (ncol(df) >= 5) & (ncol(df) <= 10)) {
    print(df[(nrow(df)-4):nrow(df), (ncol(df)-4):ncol(df)])
  }
}
```

6

```
func6 = function(df) {
  if ((nrow(df) >= 5) & (ncol(df) >= 10)) {
    print(df[(nrow(df)-4):nrow(df), 1:5])
  }
}
```

Test above functions:

```
df1 = data.frame(a=1:2, b=1:2)
func1(df1)
```

```
##   a b
## 1 1 1
## 2 2 2
```

```
df2 = data.frame(a=1:2, b=1:2, c=1:2, d=1:2, e=1:2, f=1:2)
func2(df2)
```

```
##   b c d e f
## 1 1 1 1 1 1
## 2 2 2 2 2 2
```

```r
df3 = data.frame(a=1:2, b=1:2, c=1:2, d=1:2, e=1:2, f=1:2, g=1:2, h=1:2, i=1:2, j=1:2)
func3(df3)
```

```
##   a b c d e
## 1 1 1 1 1 1
## 2 2 2 2 2 2
```

```r
df4 = data.frame(a=1:6, b=1:6)
func4(df4)
```

```
##   a b
## 2 2 2
## 3 3 3
## 4 4 4
## 5 5 5
## 6 6 6
```

```r
df5 = data.frame(a=1:6, b=1:6, c=1:6, d=1:6, e=1:6, f=1:6)
func5(df5)
```

```
##   b c d e f
## 2 2 2 2 2 2
## 3 3 3 3 3 3
## 4 4 4 4 4 4
## 5 5 5 5 5 5
## 6 6 6 6 6 6
```

```r
df6 = data.frame(a=1:6, b=1:6, c=1:6, d=1:6, e=1:6, f=1:6, g=1:6, h=1:6, i=1:6, j=1:6)
func6(df6)
```

```
##   a b c d e
## 2 2 2 2 2 2
## 3 3 3 3 3 3
## 4 4 4 4 4 4
## 5 5 5 5 5 5
## 6 6 6 6 6 6
```