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# Class Prep 1: 1.1.3 to 1.3.1

library(cmna)

## Chapter 1

### Section 1.1.3

```
count <- 0
m <- 10

for( i in 1:m)
  count <- count + 1

count
```

```
## [1] 10
```

```
count <- 0
m <- 10
n <- 7

for(i in 1:m)
  for(j in 1:n)
    count <- count + 1

count
```

```
## [1] 70
```

```
count <- 0
m <- 10

for( i in 1:m)
  for(j in 1:i)
    count <- count + 1

count
```

```
## [1] 55
```

```
isPrime <- function(n) {
  if(n == 2)
    return (TRUE)

  for(i in 2:sqrt(n))
    if(n %% i == 0)
      return(FALSE)

  return(TRUE)
}

count <- 0
m <- 10
x <- 1:100
y <- rep(1, 100)

for( i in 1:m)
  y <- y * x
  count <- count + 1

count
```

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

## Section 1.21

```
TRUE == -1; TRUE == 0; TRUE == 1; TRUE == 3.14
```

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

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

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

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

```
FALSE == -1; FALSE == 0;  FALSE == 1; FALSE == 3.14
```

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

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

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

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

```
TRUE < FALSE; TRUE > FALSE
```

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

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

```
x <- c(TRUE, FALSE, TRUE, FALSE, TRUE)
```

```
sum(x); mean(x); length(x)
```

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

```
## [1] 0.6
```

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

```
x <- c(1 ,2 ,3, 4, 3, 1, 2, 3, 3, 4, 1, 3, 4, 3)
```

```
sum(x == 3)
```

```
## [1] 6
```

```
x <- c(1 ,2 ,3, 4, 3, 1, 2, 3, 3, 4, 1, 3, 4, 3)
```

```
sum(x == 3)
```

```
## [1] 6
```

```
sum(x < 3)
```

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

```
x <- 3.14
is.numeric(x)

## [1] TRUE

is.integer(x)

## [1] FALSE

is.integer(3)

## [1] FALSE

is.integer(3)

## [1] FALSE

x <- 3.14
as.numeric(x)

## [1] 3.14

as.integer(x)

## [1] 3
```

## Section 1.2.2

```
(x <- c(1, 0, 1, 0))

## [1] 1 0 1 0

(y <- c(x, 2, 4, 6))

## [1] 1 0 1 0 2 4 6

(z <- c(x, y))

##  [1] 1 0 1 0 1 0 1 0 2 4 6

z[10]

## [1] 4

z[c(10, 9, 1)]

## [1] 4 2 1

(z1 <- list(a = 3, b = 4))

## $a
## [1] 3
##
## $b
## [1] 4

(z2 <- list(s = "test", nine = 9))

## $s
## [1] "test"
##
## $nine
## [1] 9

(z <- list(z1, z2))

## [[1]]
## [[1]]$a
## [1] 3
##
## [[1]]$b
## [1] 4
##
##
## [[2]]
## [[2]]$s
## [1] "test"
##
## [[2]]$nine
## [1] 9
```

```
(A <- matrix(1:12, 3, 4))
```

```
##      [,1] [,2] [,3] [,4]
## [1,]    1    4    7   10
## [2,]    2    5    8   11
## [3,]    3    6    9   12
```

```
A[2, 3]
```

```
## [1] 8
```

```
A[2,  ]
```

```
## [1]  2  5  8 11
```

```
A[,3]
```

```
## [1] 7 8 9
```

```
x1 <- 1:3
x2 <- 2:6
cbind(x1, x2)
```

```
## Warning in cbind(x1, x2): number of rows of result is not a multiple of
vector
## length (arg 1)
```

```
##      x1 x2
## [1,]  1  2
## [2,]  2  3
## [3,]  3  4
## [4,]  1  5
## [5,]  2  6
```

```
rbind(x1, x2)
```

```
## Warning in rbind(x1, x2): number of columns of result is not a multiple of
## vector length (arg 1)
```

```
##    [,1] [,2] [,3] [,4] [,5]
## x1    1    2    3    1    2
## x2    2    3    4    5    6
```

```
(A)
```

```
##      [,1] [,2] [,3] [,4]
## [1,]    1    4    7   10
## [2,]    2    5    8   11
## [3,]    3    6    9   12
```

```
t(A)
```

```
##      [,1] [,2] [,3]
## [1,]    1    2    3
## [2,]    4    5    6
## [3,]    7    8    9
## [4,]   10   11   12
```

```
t(x)
```

```
##      [,1] [,2] [,3] [,4]
## [1,]    1    0    1    0
```

```
t(t(x))
```

```
##      [,1]
## [1,]    1
## [2,]    0
## [3,]    1
## [4,]    0
```

```
NA == NA
```

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

```
NA == 1
```

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

```
natest <- c(1, 2, NA, 4, 5)
is.na(natest)
```

```
## [1] FALSE FALSE  TRUE FALSE FALSE
```

## Section 1.3.1

```
naivesum <- function(x) {
  s <- 0
  n <- length(x)

  for(i in 1:n)
    s <- s + x[i]
  return(s)
}


x <- c(1, 2, 3, 4.5, -6)
naivesum(x)
```

```
## [1] 4.5
```

```
pwisesum <- function(x) {
  n <- length(x)

  if(n == 1)
    return(x)
  m = floor(n / 2)
  return(pwisesum(x[1:m]) + pwisesum(x[(m + 1):n]))
}

pwisesum(x)
```

```
## [1] 4.5
```

```
kahansum <- function(x) {
  comp <- s <- 0
  n <- length(x)

  for(i in 1:n) {
    y <- x[i] - comp
    t <- x[i] + s
    comp <- (t - s) - y
    s <- t
  }


  return(s)
}

kahansum(x)
```

```
## [1] 4.5
```

```
sum(c(1, 2, 3, 4, NA, 5))
## [1] NA
sum(c(1, 2, 3, 4, NA, 5), na.rm = TRUE)
## [1] 15
```