Class Prep 6 | 2.4.1 - 3.1.1

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Section 2.4.1 Simple Division Algorithms

```r
naivediv = function(m, n){
  quot = 0
  r = m

  if(n==0)
    stop("Attempted division by 0")

  while( r>= n) {
    quot = quot + 1
    r = r - n
  }
  return(list(quotient = quot, remander = r))
}
```

```r
naivediv(314, 7)
```

```
## $quotient
## [1] 44
##
## $remander
## [1] 6
```

```r
floor(314/7)
```

```
## [1] 44
```

```r
314%%7
```

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

```r
longdiv = function(m, n){
  quot = 0
  r = 0

  if(n == 0)
    stop("Attempted division by 0")

  for(i in 31:0){
    r = bitwShiftL(r,1)
    r = r + bitwAnd(bitwShiftR(m,i), 1)
    if(r >= n) {
      r = r - n
      quot = quot + bitwShiftL(1, i)
    }
  }
  return(list(quotient = quot, remainder = r))
}


longdiv(314, 7)
```

```
## $quotient
## [1] 44
##
## $remainder
## [1] 6
```

Section 3.1.1 Vector and Matrix Operations

```
u = c(1, 2, 3); v = c(8, 4, 2); x = 7
u + x

## [1]  8  9 10

u + v

## [1] 9 6 5

u + c(1,9)

## Warning in u + c(1, 9): longer object length is not a multiple of shorter
object
## length

## [1]  2 11  4

A = matrix(1:9, 3)
A + 1

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

A + c(1, 2, 3)

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

A + 1

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

A + c(1,2) - A

## Warning in A + c(1, 2): longer object length is not a multiple of shorter
object
## length

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

```r
A + c(1, 2, 3) - A
```

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

```r
B = matrix(1:6, 3)
status = try(A+B)
```

```
## Error in A + B : non-conformable arrays
```

```r
print(status[1])
```

```
## [1] "Error in A + B : non-conformable arrays\n"
```

```r
A %*% B
```

```
##      [,1] [,2]
## [1,]   30   66
## [2,]   36   81
## [3,]   42   96
```

```r
u %*% v
```

```
##      [,1]
## [1,]   22
```

```r
diag(A)
```

```
## [1] 1 5 9
```

```r
diag(B)
```

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

```r
diag(u)
```

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

```r
diag(1,4)
```

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

```
nrow(B)

## [1] 3

ncol(B)

## [1] 2

nrow(u)

## NULL

ncol(u)

## NULL

length(u)

## [1] 3

length(B)

## [1] 6

dim(B)

## [1] 3 2
```