Class Prep 4: 2.3.1 to 2.3.2

# Chapter 2: Error Analysis

## Section 2.3.3: Overflow and Underflow

library(cmna)  
library(pracma)

##   
## Attaching package: 'pracma'

## The following objects are masked from 'package:cmna':  
##   
## cubicspline, horner, newton, nthroot, romberg, secant, wilkinson

.Machine$double.xmin

## [1] 2.225074e-308

.Machine$double.xmin / 2

## [1] 1.112537e-308

.Machine$double.xmax

## [1] 1.797693e+308

2147483647L \* 2L

## Warning in 2147483647L \* 2L: NAs produced by integer overflow

## [1] NA

2147483647L

## [1] 2147483647

.Machine$double.xmax \* 2

## [1] Inf

## Section 2.3.4: Error Propogation and Stability

## Section 2.4.1: Simple Division Algorithms

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, remainder = r))  
}  
  
naivediv(314, 7)

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

floor(314 / 7)

## [1] 44

314 %% 7

## [1] 6

## Section 2.4.2: Binary Long Division

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