# Operations

## 1. Arithmetic Operators

### Challenge 1

#assigning the variables  
x <- 5   
y <- 16

#### Addition Code

x+y

## [1] 21

#### Subtraction Code

x-y

## [1] -11

#### Multiplication Code

# Question: Multiply x and y  
x\*y

## [1] 80

#### Division Code

# Question: Divide x by y  
x/y

## [1] 0.3125

#### Modulus Code

# Question: Get the modulo of y and x  
x%%y

## [1] 5

### Challenge 2

# ---  
# Find the addition, substraction, multiplication, division, modulus of a and b when a = 10 and b = 4.  
# Hint: Before we even start formulating a solution,   
# lets assign the value 10 to variable a and assign the value 4 to a variable b.  
# ---

#Assigning variables  
a=10  
b=4

#Addition  
a+b

## [1] 14

# Substraction  
a-b

## [1] 6

# Multiplication  
a\*b

## [1] 40

# Division  
a/b

## [1] 2.5

# Modulus  
a%%b

## [1] 2

### Challenge 3

# Question: Fix the code below to get an output of 1.   
# Hint: You can change the values of the variables to get the output  
#c <- 10  
#d <- 2  
#c %% d  
  
c <- 10  
d <- 3  
c %% d

## [1] 1

### Challenge 4

# Question: Fix the code below to get an output of 25.   
# Hint: You can change one of the operators to the subtraction operator - and get an answer  
  
#a <- 5  
#b <- 4  
#b - a + 10 / 2 \* a \* 3 + 10 + 59  
# ---  
  
a <- 5  
b <- 4  
b - a + 10 / 2 \* a \* 3 + 10 - 59

## [1] 25

## 2. Relational Operators

#### 2.1 Less than Code

x<y

## [1] TRUE

y<x

## [1] FALSE

#### 2.2 Greater than Code

#find if x is greater than y  
x>y

## [1] FALSE

#find if y is greater x  
y>x

## [1] TRUE

# Question: Find whether x is less than or equal to y   
x<=y

## [1] TRUE

# Question: Find out below whether x is greater than or equal to y   
x>=y

## [1] FALSE

# Question: Find out whether y is equal to y  
y==y

## [1] TRUE

# Question: Find out whether x is not equal to y  
x!=y

## [1] TRUE

## 3. Logical Operators

#### 3.1 Element-wise Logical AND operator

# Question: Lets create two vectors v and t  
# ---  
# assign to variables  
v <- c(3,1,TRUE,2+3i)   
t <- c(4,1,FALSE,2+3i)   
v

## [1] 3+0i 1+0i 1+0i 2+3i

t

## [1] 4+0i 1+0i 0+0i 2+3i

# Then use the element-wise logical and operator & as follows  
v&t

## [1] TRUE TRUE FALSE TRUE

#### 3.2 Element-wise Logical OR operator

# Question: Create again two vectors v and t  
# ---  
#   
v <- c(0,0,TRUE,2+2i)   
t <- c(0,3,TRUE,2+3i)   
  
# Then use the element-wise logical or operator | below  
v|t

## [1] FALSE TRUE TRUE TRUE

#### 3.3 The Logical OR operator

# ---  
# Question: Let create two vectors v and t  
# ---  
#   
v <- c(3,1,TRUE,2+3i)   
t <- c(4,1,FALSE,2+3i)   
  
# This time, use the logical not operator ||  
v||t

## [1] TRUE

#### 3.4 The Logical AND operator

# Question: Create two vectors v and t then use the logical AND operator  
# ---  
#   
v <- c(3,1,TRUE,2+3i)   
t <- c(4,1,FALSE,2+3i)   
v&&t

## [1] TRUE

## 4. Assignment Operators

#### 4.1 Left Assignment Operator

# Question: Create variables v1, v2 and v3, assigning them with vectors   
# using the left assignment operators v1, v2 and v3  
# ---  
#   
v1 <- c(3,1,TRUE,2+3i)   
v2 <<- c(3,1,TRUE,2+3i)   
v3 = c(3,1,TRUE,2+3i)

# Then we print out v1   
v1

## [1] 3+0i 1+0i 1+0i 2+3i

# And print out v2  
v2

## [1] 3+0i 1+0i 1+0i 2+3i

# And now print out v3  
v3

## [1] 3+0i 1+0i 1+0i 2+3i

#### 4.2 Right Assignment Operator

## Challenge  
# ---  
# Question: Use the right asignment operators to assign vectors to the variables v1 and v2   
# ---  
  
 c(3,1,TRUE,2+3i) -> v1  
 c(3,1,TRUE,2+3i)->>v2

# Then print out variable v1 and see what has happened  
v1

## [1] 3+0i 1+0i 1+0i 2+3i

# And also print out variable v2  
v2

## [1] 3+0i 1+0i 1+0i 2+3i

## 5. Variable Assignment

#### 5.1 Right Assignment Operator

# Question: Use the right assignment operators to assign the vectors to the respective variables as shown below;  
# ---  
#   
variable.1 = c(3,4,5,6)   
variable.2 <- c("Hello"," there")   
c(TRUE,2) -> variable.3  
  
variable.1

## [1] 3 4 5 6

variable.2

## [1] "Hello" " there"

variable.3

## [1] 1 2

## 6. Basic Data Types

#### 6.1 Numeric Data Type

# Question: To learn about the numeric data type,   
# lets assign the value 62.4 to the variable m  
m=62.4  
  
# Print out the variable's value  
m

## [1] 62.4

#### 6.2 Integer Data Type

#create an integer 3 and assign it to the variable n  
n=3  
  
# Then print n  
n

## [1] 3

# Using another example, lets create convert 3.14 to an interger   
# and assign the converted value to the variable p  
# ---  
#  
p=as.integer(3.14)  
  
# And print out the value p   
p

## [1] 3

#### 6.3 Complex Data Type

# We can also assign a complex number and assign it to the variable k just as shown below  
# ---  
#   
k = 1 + 2i  
  
# Now lets print out k   
k

## [1] 1+2i

#### 6.4 Logical Data Type

# To create a logical value we are first going to create two variables x and y variables  
# ---  
#  
x = 4; y = 6  
  
# Now we check whether x is greater than y  
# ---  
#   
z = x > y   
  
# And then print out the logical value  
z

## [1] FALSE

#### 6.5 Character Data Type

# Convert the value 62.48 to a string and store it a variable g  
# ---  
#  
g = as.character(62.48)   
  
# Then print the character string g  
# ---  
#  
g

## [1] "62.48"