Coding Help Sheet 1

R Data Types, Functions, Operators, and Vectors

Fred Hutch Cancer Center

R Basic Data Types

character: sometimes referred to as string data, tends to be surrounded by quotes. Ex: "string"

numeric: real or decimal numbers, sometimes referred to as "double". Ex: 1.23

integer: a subset of numeric in which numbers are stored as integers. Ex: 1

logical: Boolean data (TRUE and FALSE)

Variables

Variables store R values

Naming rules:

- case sensitive
- cannot start with numbers
- avoid common R keywords

```
# Use # to write comments in R!
var <- 5
intro <- "hello world"
var <- 5 * var / 2
```

Functions

Functions are operations we can perform on R values

- able to switch the order of arguments, as long as explicitly state argument types

Commonly Used Functions

round(val)	Round given number to nearest integer
ceiling(val)	Round given number to the next largest integer
floor(val)	Round given number to the next smallest integer
log(val)	Returns the log of the value
exp(val)	Returns the exponential of the value
sqrt(val)	Returns the square root of the value
max(vector)	Returns max value in vector
toupper(string)	Converts the string to all uppercase letters
tolower(string)	Converts the string to all lowercase letters
substr(string, start, stop)	Returns the substring of the string from the start position to the stop position

Vectors

Vectors store a series of values in a collection which can include various R data types

```
ages <- c(50, 55, 60, 65)
names <- c("Liza", "Jose", "Liz")
```

Indexing Vectors

names[2]	"Jose"	The second element in vector x
names[-2]	"Liza" "Liz"	All but the second
names[1:2]	"Liza" "Jose"	Elements one and two
names[-(1:2)]	"Liz"	All elements except one to two

Manipulating Vectors

Below are common ways to modify vectors and add, remove, or filter elements inside a vector

```
x <- c(10, 20, 30, 40)
```

x <- c(x, 90)	10 20 30 40 90	Add a value to end of vector
x <- c(0, x)	0 10 20 30 40	Add value at the beginning
x[c(1, 3)]	10 30	Elements one and three
x[x > 20]	30 40	Extracts values which meet condition
x[x == 30]	30	Extracts values numerically equivalent values
x[x < 50 | x > 10]	20 30 40	Get values less than 50 OR greater than 10
x[x < 50 & x > 30]	40	Get values less than 50 AND greater than 30

Vector Functions

length(ages)	4	Returns the length of the vector
class(ages)	"numeric"	Returns type of object
str(ages)	num [1:4] 50 55 60 65	Returns structure of an object
mean(ages)	57.5	Return mean of values
range(ages)	50 65	Return
ages > 60	FALSE FALSE FALSE FALSE TRUE TRUE	

Common Operators

&	TRUE & FALSE	Both sides must be TRUE
|	TRUE | FALSE	Either side must be TRUE to be TRUE
!	!TRUE	Negates and returns the opposite value
^ or **	3^3	Exponent operation
%%	5%%2	Remainder of integer division, or modulus
<=	100 <= 99	Less than or equal to
>=	3 >= 1	Greater than or equal to
==	length("Fred Hutch" == 10	Check equivalence on both sides
isTRUE(x)	isTRUE(FALSE)	Test if the given value is TRUE