R үндэс

R программчлалын үндэс цуврал хичээл 2

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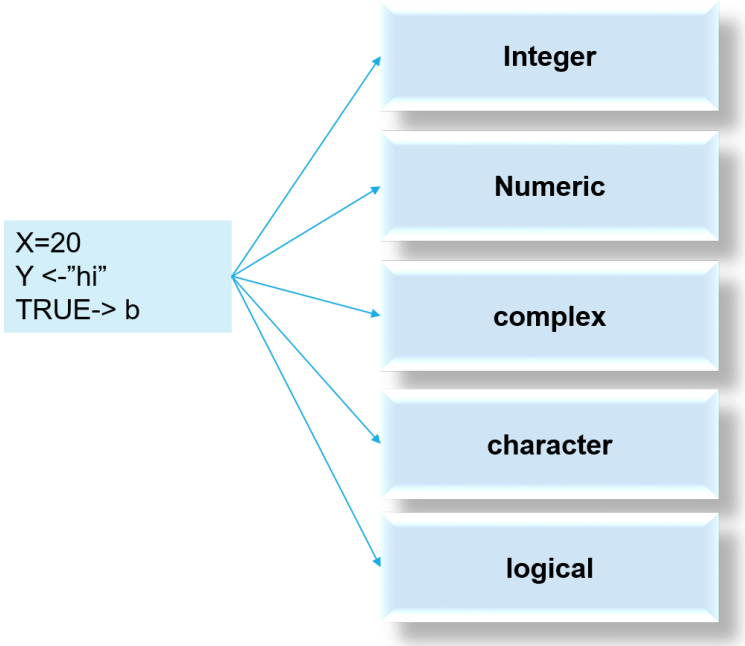
R basic агуулга

- Variables – хувьсагч
- Data types- тоон өгөгдлийн төрлүүд
- Operators - үйлдэл
- Conditional statements – нөхцөлт
- Loops
- Strings
- Functions

Variables

Variables




```
x←2L
typeof(x)
```

```
## [1] "integer"
```

```
y←2.8
typeof(y)
```

```
## [1] "double"
```

```
z←2.8+2i
typeof(z)
```

```
## [1] "complex"
```

```
a←"h"
typeof(a)
```

```
## [1] "character"
```

Data types

Data types

- **Vector**
- Matrix
- Array
- List
- Data frame

Integer	15L, 30L, 1477L
Numeric	5, 3.14, 14.5
complex	4+3i, 8+5i
character	“A” “hey”
logical	True or false

Vector

```
myfirstvector← c(2,3,4,5,4)
myfirstvector
```

```
## [1] 2 3 4 5 4
```

```
is.integer(myfirstvector)
```

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

```
is.double(myfirstvector)
```

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

```
is.numeric(myfirstvector)
```

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

```
is.character(myfirstvector)
```

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

```
class(myfirstvector)
```

```
## [1] "numeric"
```

Matrix

- Vector
- **Matrix**
- Array
- List
- Data frame

Matrix(data, nrow, ncol, byrow, dimnames)
Data – тоон өгөгдөл
Nrow – мөр
Ncol – багана
Byrow – TRUE or False
Dimnames – rows and column

Matrix

```
mydata← 1:20
mydata
```

```
##  [1]  1  2  3  4  5  6  7  8  9 10 11 12 13 14 15 16 17 18 19 20
```

```
A←matrix(mydata, 4, 5)
A
```

```
##      [,1] [,2] [,3] [,4] [,5]
## [1,]    1    5    9   13   17
## [2,]    2    6   10   14   18
## [3,]    3    7   11   15   19
## [4,]    4    8   12   16   20
```

```
A[3,4]
```

```
## [1] 15
```

Matrix

```
B←matrix(mydata,4,5,byrow = TRUE)
B
```

```
##      [,1] [,2] [,3] [,4] [,5]
## [1,]    1    2    3    4    5
## [2,]    6    7    8    9   10
## [3,]   11   12   13   14   15
## [4,]   16   17   18   19   20
```

```
B[3,5]
```

```
## [1] 15
```

```
#Example of setting row and column na
mrx ← matrix(c(1,2,3, 11,12,13),
              nrow = 2, ncol = 3,
              byrow = TRUE,
               dimnames = list(
                 c("row1", "row2"),
                 c("C.1", "C.2",
                   "C.3")))
mrx
```

```
##      C.1 C.2 C.3
## row1   1   2   3
## row2  11  12  13
```

List

- Vector
- Matrix
- Array
- **List**
- Data frame

List(data)

List

```
mydata<- 1:20
mydata
```

```
##  [1]  1  2  3  4  5  6  7  8  9 10 11 12 13 14 15 16 17 18 19 20
```

```
A<-matrix(mydata, 4, 5)
A
```

```
##      [,1] [,2] [,3] [,4] [,5]
## [1,]    1    5    9   13   17
## [2,]    2    6   10   14   18
## [3,]    3    7   11   15   19
## [4,]    4    8   12   16   20
```

List

```
mydata2←1:30
B←matrix(mydata2, 2,5)
B
```

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

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

```
mylist=list(A,B)
mylist
```

```
## [[1]]
##      [,1] [,2] [,3] [,4] [,5]
## [1,]    1    5    9   13   17
## [2,]    2    6   10   14   18
## [3,]    3    7   11   15   19
## [4,]    4    8   12   16   20
```

Dataframe

```
nomer=c(1:4)
nomer
```

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

```
NER=c("damba","anu","bat","dorj")
NER
```

```
## [1] "damba" "anu"   "bat"   "dorj"
```

```
alim=c(1,4,5,6)
alim
```

```
## [1] 1 4 5 6
```

```
data.frame(nomer,NER, alim)
```

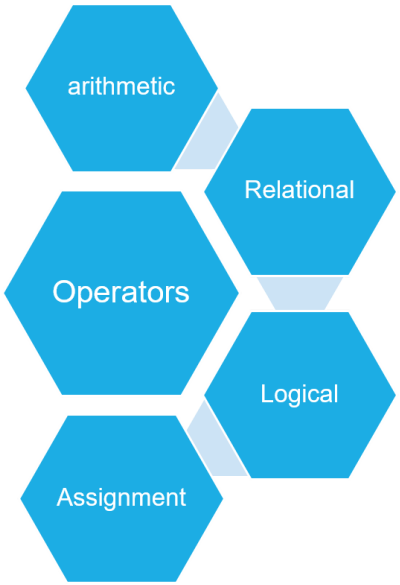
```
##   nomer   NER alim
## 1     1 damba    1
## 2     2   anu    4
## 3     3   bat    5
## 4     4  dorj    6
```

```
data.frame(cars)
```

```
##    speed dist
## 1      4    2
## 2      4   10
## 3      7    4
## 4      7   22
## 5      8   16
## 6      9   10
## 7     10   18
## 8     10   26
## 9     10   34
```

Operators

Operators



- Арифметикийн ерөнхий үйлдэл : $a + b$, $a - b$, $a * b$, a/b
- Тэнцэтэл бус : $a < b$, $a > b$, $a = b$
- Логик : a&b, $a!b$,
- For болон If loop

```
#CODE
# arithmetics
a←10
b←12
c←a+b

bat1←15
bat2←16

answer←sqrt(bat2)
answer
```

```
## [1] 4
```

```
print(2*4)
```

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

Operators

```
# Relational operations

4<5
```

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

```
4>5
```

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

```
4==5
```

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

```
result1 <-4>5
result1
```

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

```
#logical operators
# result<-!true
result2<-!(4>5)
result2
```

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

```
result1 & result2
```

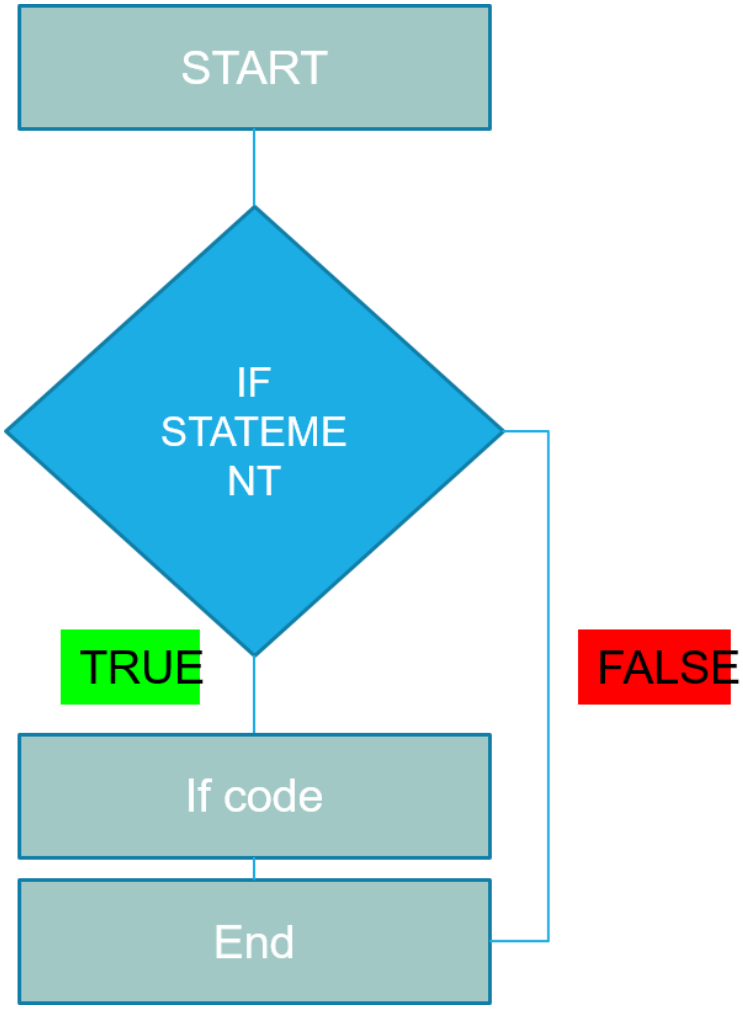
```
## [1] FALSE
```

```
isTRUE(result1)
```

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

Conditional statements

IF STATEMENT




```
VAR1=25
VAR2=35

if((VAR1+VAR2)>100){
  print("niilber n 100s ih")
} else if((VAR1+VAR2)>75){
  print("niilber n 75s ih")
} else if((VAR1+VAR2)>65){
  print("niilber n 65s ih")
} else if((VAR1+VAR2)>55){
  print("niilber n 55s ih")
}
```

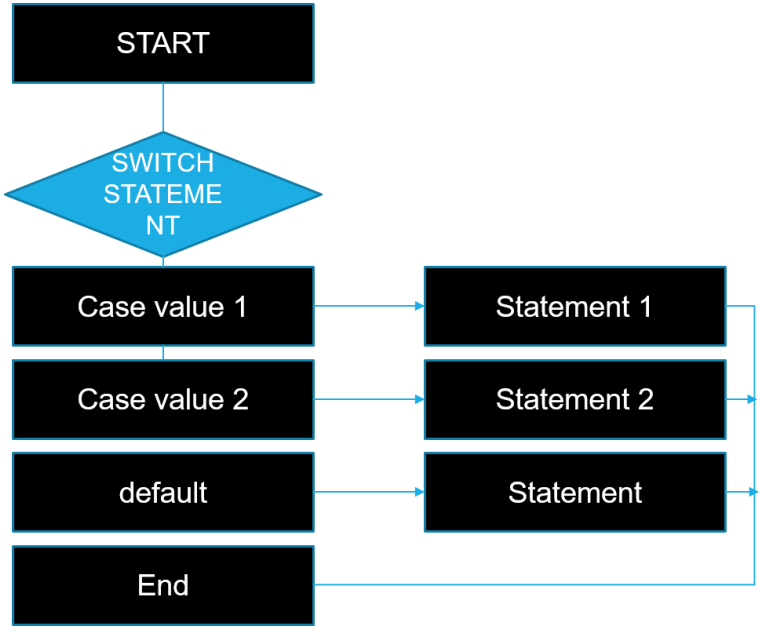
```
## [1] "niilber n 55s ih"
```

IF STATEMENT

```
# if statement
x←rnorm(1)
if(x>1){
  answer←"greater than 1"
} else if (x ⩾ -1){
  answer←"between -1 and 1"
} else {
  answer←"less than -1"
}
y←rnorm(1)
if(y<0){
print("y is negative number")
} else {
print("y is either positive")
}
```

```
## [1] "y is either positive"
```

SWITCH STATEMENT

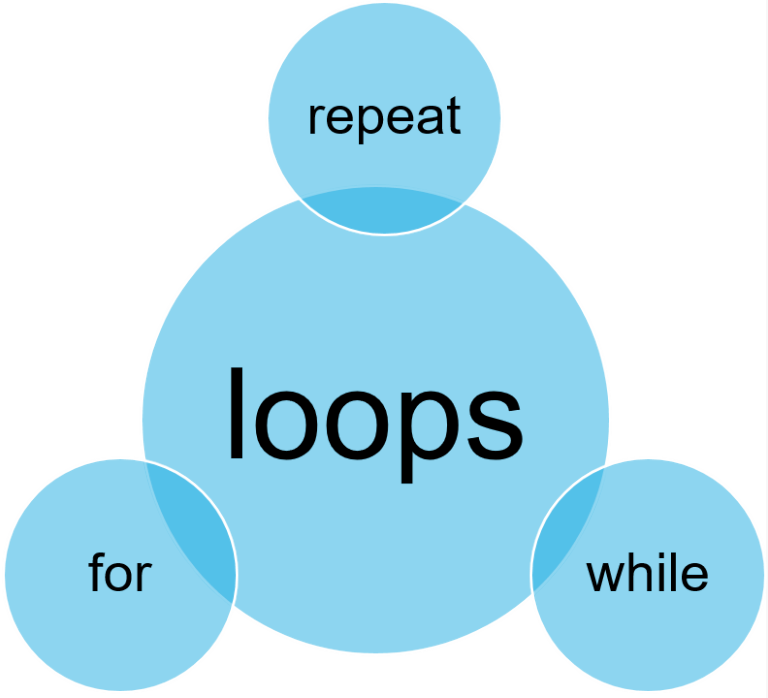



```
switch(4,
          "1"=print("dawaa"),
          "2"=print("myagmar"),
          "3"=print("lhagwa"),
          "4"=print("purew"),
          "5"=print("baasan"),
          "6"=print("byamba"),
          "7"=print("nyam")
)
```

```
## [1] "purew"
```

Loops

Loops - Group of Statements




```r
# While and For Loop
while(TRUE){
  print("hello")
}
while(FALSE){
print("hello")
}

x←1
while(x<25){
  print(x)
  x←x+1
}

for(i in 1:3){
print("hello")
}

for(i in 1:5) print(1:i)
```

`

Loops

```
#repeat
x=1
repeat{
  x←x+6
  print(x)
  if(x>32){
    break
    }
}
```

```
## [1] 7
## [1] 13
## [1] 19
## [1] 25
## [1] 31
## [1] 37
```

```
x=2
repeat{
  x←x^2
  print(x)
  if(x>100){
    break
  }
}
```

```
## [1] 4
## [1] 16
## [1] 256
```

Some functions

```
# sequence and replicate
seq(1,13) # same 1:13
```

```
##  [1]  1  2  3  4  5  6  7  8  9 10 11 12 13
```

```
seq(1,13,3)
```

```
## [1]  1  4  7 10 13
```

```
rep(5,10)
```

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

```
rep(5,20,5)
```

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

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