



INTERMEDIATE R

Relational Operators

Equality ==

```
> TRUE == TRUE  
[1] TRUE
```

```
> TRUE == FALSE  
[1] FALSE
```

```
> "hello" == "goodbye"  
[1] FALSE
```

```
> 3 == 2  
[1] FALSE
```

Inequality !=

```
> TRUE != TRUE  
[1] FALSE
```

```
> TRUE != FALSE  
[1] TRUE
```

```
> "hello" != "goodbye"  
[1] TRUE
```

```
> 3 != 2  
[1] TRUE
```

< and >

```
> 3 < 5  
[1] TRUE
```

```
> 3 > 5  
[1] FALSE
```

```
> "Hello" > "Goodbye"  
[1] TRUE
```

Alphabetical Order!

```
> TRUE < FALSE  
[1] FALSE
```

TRUE coerces to 1
FALSE coerces to 0

\leq and \geq

```
> 5 >= 3  
[1] TRUE
```

```
> 3 >= 3  
[1] TRUE
```

Relational Operators & Vectors

```
> linkedin <- c(16, 9, 13, 5, 2, 17, 14)

> linkedin
[1] 16  9 13  5  2 17 14

> linkedin > 10
[1]  TRUE FALSE  TRUE FALSE FALSE  TRUE  TRUE

> facebook <- c(17, 7, 5, 16, 8, 13, 14)

> facebook
[1] 17  7  5 16  8 13 14

> facebook <= linkedin
[1] FALSE  TRUE  TRUE FALSE FALSE  TRUE  TRUE
```



INTERMEDIATE R

Logical Operators

Logical Operators

- AND operator &
- OR operator |
- NOT operator !

AND operator &

```
> TRUE & TRUE  
[1] TRUE
```

Only TRUE if both are TRUE

```
> FALSE & TRUE  
[1] FALSE
```

```
> TRUE & FALSE  
[1] FALSE
```

FALSE otherwise

```
> FALSE & FALSE  
[1] FALSE
```


AND operator &

```
> x <- 12
```

TRUE TRUE

```
> x > 5 & x < 15
```

```
[1] TRUE
```

```
> x <- 17
```

TRUE FALSE

```
> x > 5 & x < 15
```

```
[1] FALSE
```

OR operator |

```
> TRUE | TRUE  
[1] TRUE
```

```
> TRUE | FALSE  
[1] TRUE
```

TRUE if at least one is TRUE

```
> FALSE | TRUE  
[1] TRUE
```

Only FALSE if both FALSE

```
> FALSE | FALSE  
[1] FALSE
```

OR operator |

```
> y <- 4
```

```
      TRUE  FALSE  
> y < 5 | y > 15  
[1] TRUE
```

```
> y <- 14
```

```
      FALSE  FALSE  
> y < 5 | y > 15  
[1] FALSE
```

NOT operator !

```
> !TRUE  
[1] FALSE  
  
> !FALSE  
[1] TRUE  
  
> !(x < 5)  
> x >= 5
```

```
> is.numeric(5)  
[1] TRUE  
  
> !is.numeric(5)  
[1] FALSE  
  
> is.numeric("hello")  
[1] FALSE  
  
> !is.numeric("hello")  
[1] TRUE
```

Logical Operators & Vectors

```
> c(TRUE, TRUE, FALSE) & c(TRUE, FALSE, FALSE)
[1] TRUE FALSE FALSE
```

```
> c(TRUE, TRUE, FALSE) | c(TRUE, FALSE, FALSE)
[1] TRUE TRUE FALSE
```

```
> !c(TRUE, TRUE, FALSE)
[1] FALSE FALSE TRUE
```

& vs &&, | vs ||

```
> c(TRUE, TRUE, FALSE) & c(TRUE, FALSE, FALSE)
[1] TRUE FALSE FALSE

> c(TRUE, TRUE, FALSE) && c(TRUE, FALSE, FALSE)
[1] TRUE

> c(TRUE, TRUE, FALSE) | c(TRUE, FALSE, FALSE)
[1] TRUE TRUE FALSE

> c(TRUE, TRUE, FALSE) || c(TRUE, FALSE, FALSE)
[1] TRUE
```



INTERMEDIATE R

Conditional Statements

if statement

```
if(condition) {  
  expr  
}
```



```
> x <- -3  
  
> if(x < 0) {  
  print("x is a negative number")  
}  
[1] "x is a negative number"
```


if statement

```
if(condition) {  
  expr  
}
```



```
> x <- 5  
      FALSE  
> if(x < 0) {  
  print("x is a negative number")  
}
```

No printout!

else statement

```
if(condition) {  
  expr1  
} else {  
  expr2  
}
```



else statement

```
if(condition) {  
  expr1  
} else {  
  expr2  
}
```



```
> x <- -3  
      TRUE  
> if(x < 0) {  
  print("x is a negative number")  
} else {  
  print("x is either a positive number or zero")  
}  
[1] "x is a negative number"
```

else statement

```
if(condition) {  
  expr1  
} else {  
  expr2  
}
```



```
> x <- 5  
      FALSE  
> if(x < 0) {  
  print("x is a negative number")  
} else {  
  print("x is either a positive number or zero")  
}  
[1] "x is either a positive number or zero"
```


else if statement

```
if(condition1) {  
  expr1  
} else if(condition2) {  
  expr2  
} else {  
  expr3  
}
```



else if statement


```
> x <- -3
      TRUE
> if(x < 0) {
  print("x is a negative number")
} else if(x == 0) {
  print("x is zero")
} else {
  print("x is a positive number")
}
[1] "x is a negative number"
```



```
if(condition1) {
  expr1
} else if(condition2) {
  expr2
} else {
  expr3
}
```

else if statement


```
> x <- 0
FALSE
> if(x < 0) {
  print("x is a negative number")
} else if(x == 0) { TRUE
  print("x is zero")
} else {
  print("x is a positive number")
}
[1] "x is zero"
```



```
if(condition1) {
  expr1
} else if(condition2) {
  expr2
} else {
  expr3
}
```

else statement

```
> x <- 5
      FALSE
> if(x < 0) {
  print("x is a negative number")
} else if(x == 0) { FALSE
  print("x is zero")
} else {
  print("x is a positive number")
}
[1] "x is a positive number"
```



```
if(condition1) {
  expr1
} else if(condition2) {
  expr2
} else {
  expr3
}
```


if, else if, else

```
> x <- 6
      TRUE
> if(x %% 2 == 0) {
  print("divisible by 2")
X} else if(x %% 3 == 0) {
X  print("divisible by 3")
X} else {
X  print("not divisible by 2 nor by 3...")
X}
[1] "divisible by 2"
```