Introduction to R Programming
Lecture 3

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April 15, 2015

1 Last Lecture - List

```
> x = matrix(1:20, nrow=5, ncol=4, byrow=TRUE)
> swim = read.csv("http://www.macalester.edu/~kaplan/ISM/datasets/swim100m.csv")
> mylist=list(swim,x)
> mylist[[2]][2]

[1] 5

> mylist[[2]][1:2]

[1] 1 5

> mylist[[2]][1:2,3]

[1] 3 7

> mylist[[2]][1:2,]

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

2 Operators

>, >=, <, <=, ==, !=, x | y, x & y

3 Control Flow

3.1 Repetition and looping

Looping constructs repetitively execute a statement or series of statements until a condition is not true. These include the **for** and **while** structures.

```
> #For-Loop
> for(i in 1:10){
+   print(i)
+ }

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

> #While-Loop
> i = 1
> while(i <= 10){
+   print(i)
+   i=i+1
+ }

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

3.2 Conditional Execution

In conditional execution, a statement or statements are only executed if a specified condition is met. These constructs include **if**, **if-else**, and **switch**.

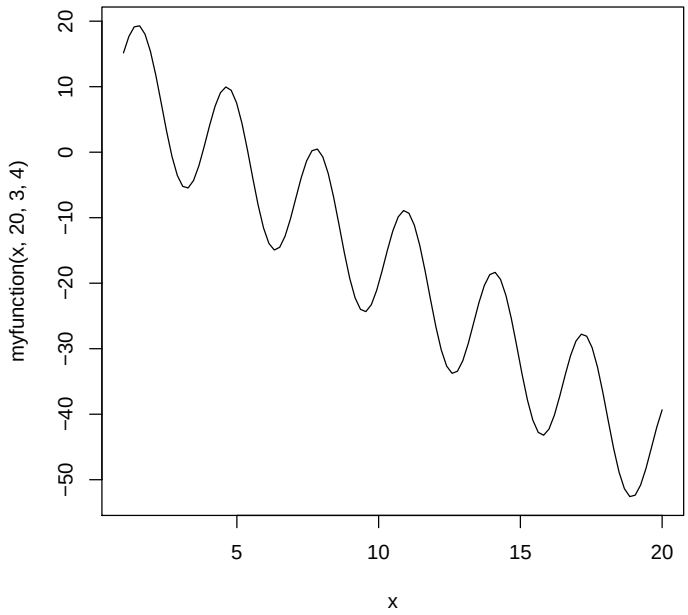
```
> #If statement
> i = 1
> if(i == 1){
+   print("Hello World")
+ }

[1] "Hello World"
```

```
> #If-else statement
> i = 2
> if(i == 1){
+   print("Hello World!")
+ }else{
+   print("Goodbye World!")
+ }

[1] "Goodbye World!"

> #switch
> #switch(expression, cnoditions)
> feelings = c("sad", "afraid")
> for (i in feelings){
+   print(
+     switch(i,
+            happy  = "I am glad you are happy",
+            afraid = "There is nothing to fear",
+            sad    = "Cheer up",
+            angry  = "Calm down now"
+            )
+     )
+ }

[1] "Cheer up"
[1] "There is nothing to fear"
```

4 User-defined Function

One of greatest strengths of R is the ability to add functions. In fact, many of the functions in R are functions of existing functions.

```
> myfunction = function(x,a,b,c){
+   return(a*sin(x)^2 - b*x + c)
+ }
> curve(myfunction(x,20,3,4),xlim=c(1,20))
```




```
> myfeeling = function(x){
+     for (i in x){
+       print(
+         switch(i,
+                happy  = "I am glad you are happy",
+                afraid = "There is nothing to fear",
+                sad    = "Cheer up",
+                angry  = "Calm down now"
+                )
+         )
+     }
+ }
> feelings = c("sad", "afraid")
> myfeeling(feelings)

[1] "Cheer up"
[1] "There is nothing to fear"
```