1 Functions Review

```
function add_one(x)
    res = x + 1
    return res
end


function add_something(x, a)
    res = x + a
    return res
end


function add_many_somethings(x, a)
    n = length(x)
    res = zeros(n)
    for i = 1:n
        res[i] = x[i] + a
    end
    return res
end
```

2 Type Basics

```
using DataFrames

# Use the typeof() function to determine a variable's type
a = 42
typeof(a)

b = randn(10)
typeof(b)

c = "some words"
typeof(c)

Int64 <: Number
Real <: Number
String <: Float64
Array{Int,2} <: Any


df1 = DataFrame(a = rand(100), b = randn(100), c = rand(['x', 'y', 'z'], 100))

typeof(df1)

eltype(df1[:c])
```

3 Data Access

```
function row_means(X)
    n = size(X, 1)
    res = zeros(n)
    for i = 1:n
        res[i] = mean(X[i, :])
    end
```

```
    return res
end


function row_means2(X)
    n = size(X, 1)
    res = zeros(n)
    for i = 1:n
        res[i] = mean(view(X, i, :))
    end
    return res
end


A = randn(1_000_000, 1000)

@time row_means(A)
@time row_means2(A)
```

4 Parallelism

```
using Base.Threads

function mult_by_threadid(n)
    res = ones(Int, n)
    @threads for i = 1:n
        res[i] = res[i] * threadid()
    end
    res
end

a = mult_by_threadid(1024)
showall(a)
```