



# Introduction to the R Language

## Vectorized Operations

Roger Peng, Associate Professor  
Johns Hopkins Bloomberg School of Public Health

# Vectorized Operations

Many operations in R are *vectorized* making code more efficient, concise, and easier to read.

```
> x <- 1:4; y <- 6:9
> x + y
[1] 7 9 11 13
> x > 2
[1] FALSE FALSE  TRUE  TRUE
> x >= 2
[1] FALSE  TRUE  TRUE  TRUE
> y == 8
[1] FALSE FALSE TRUE FALSE
> x * y
[1] 6 14 24 36
> x / y
[1] 0.1666667 0.2857143 0.3750000 0.4444444
```

# Vectorized Matrix Operations

```
> x <- matrix(1:4, 2, 2); y <- matrix(rep(10, 4), 2, 2)
> x * y      ## element-wise multiplication
      [,1] [,2]
[1,]   10  30
[2,]   20  40
> x / y
      [,1] [,2]
[1,]  0.1  0.3
[2,]  0.2  0.4
> x %*% y     ## true matrix multiplication
      [,1] [,2]
[1,]   40  40
[2,]   60  60
```