Chapter 2: Linear Regression

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November 19, 2024

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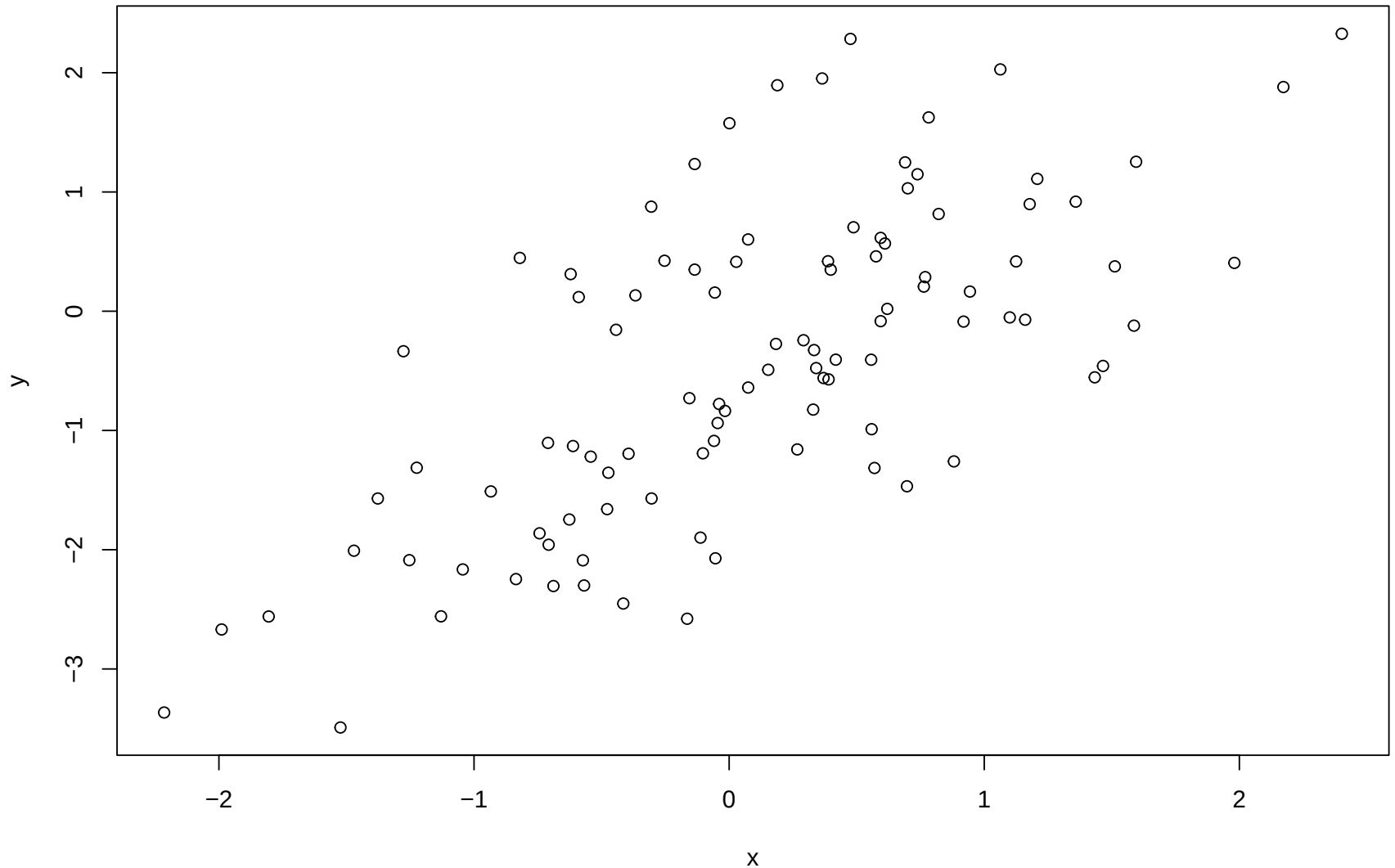
Outline

Generate Data

```r
beta = c(-0.5, 1)
n = 100 ; x = rnorm(n) ; y = beta[1] + beta[2] * x + rnorm(n)
plot(x, y)
```



Least Squares algorithm for Simple Linear Regression

```
ls = function(x, y){
  beta_hat1 = crossprod(x - mean(x), y - mean(y)) / crossprod(x - mean(x))
  beta_hat0 = mean(y) - beta_hat1 * mean(x)

  return(list("intercept" = as.numeric(beta_hat0),
              "slope" = as.numeric(beta_hat1)))
}

beta ; ls(x, y)
```

```
## [1] -0.5  1.0
```

```
## $intercept
## [1] -0.5376926
##
## $slope
## [1] 0.9989396
```

Plot of Simple Linear regression (Original vs. Centering)

```
c(ls(x, y)$intercept, ls(x - mean(x), y - mean(y))$intercept)
```

```
## [1] -5.376926e-01  1.917450e-18
```

```
c(ls(x, y)$slope, ls(x - mean(x), y - mean(y))$slope)
```

```
## [1] 0.9989396 0.9989396
```