

Homework #1 CSCI 036

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Statistics

Find by hand the sample average of 3.1, 4.2, and 2.6. We can also do this in R by assigning the vector to a variable name, and then using the `mean` command. Try the following code and see if your answer was correct:

```
v <- c(3.1,4.2,2.6)
mean(v)
```

```
## [1] 3.3
```

1. The following command in R assigns a vector of length 4 to the variable `x`:

(a) Find the sample average of the vector `x` with the `mean` command.

```
## [1] 0.375
```

(b) Find the sample standard deviation with the `'sd'` command.

```
std <- sd(x)
std
```

```
## [1] 0.25
```

(c) Use `'sum'` to add the values in the vector together.

```
sum<- sum(x)
sum
```

```
## [1] 1.5
```

(d) Find the sum of the squares of the values `'x'`. (Hint: Use `'x^2'` to get the vector whose components are the squares of the components of `x`.)

```
sum_squares <- sum (x^2)
sum_squares
```

```
## [1] 0.75
```

2. Consider the built in data set `ToothGrowth` in R.

a. What are the units on the dose of Vitamin C? (Remember that you can information about a command or variable in R by typing a `?` followed by the thing you are trying to get help about in the console.)

```
units <- "milligrams"
```

b. Use the 'summary' command in the console to determine the mean length that the teeth grow in the guinea pigs.

```
mean_length <- 18.81
```

c. Use the 'summary' command to find the median length that the teeth grow in the guinea pigs.

```
median_length <- 19.25
```

d. Use 'plot(ToothGrowth\$dose,ToothGrowth\$len)' to see how the length of the teeth varies with Vitamin C dose.

```
answer <- "YES"
```

3. The command

```
y <- runif(n = 10,min = 0, max = 1)
```

will generate 10 uniform random numbers from 0 to 1, and place them in the vector y.

(a) Modify this command to create a vector z of a million uniforms.

```
z <- runif(n = 1000000,min = 0, max = 1)
```

(b) Find the sample mean of your uniforms.

```
z_mean <- mean(z)
z_mean
```

```
## [1] 0.5002236
```

(c) Find the sample standard deviation of your uniforms.

```
z_std <- sd(z)
z_std
```

```
## [1] 0.2885749
```

4. a. Write code to create a vector u consisting of the numbers 1, 2, 3 and 4. Then, create a vector called a which is 6*u. (Make sure you look at a to see what it is.)

```
u <- 1:4
a <- 6*u
a
```

```
## [1] 6 12 18 24
```

b. Assign 'w <- c(4,0,2,1)'. Then, create a vector 'b' which is 'u*w'. (What vector is this?)

```
w <- c(4,0,2,1)
b <- u*w
b
```

```
## [1] 4 0 6 4
```

c. Assign 'x <- c(1,2)'. Then, create a vector 'c' which is 'u*x'. (What is that?!)

```
x <- c(1,2)
c <- u*x
c
```

```
## [1] 1 4 3 8
```