

Lab Exercise One

Question One:

Let $x = \text{sample}(1:20, 100, \text{replace} = \text{T})$ \ a. Add 3 to just the odd-index elements \ b. Compute the square root of each element. \

Answer:

```
# part a
x <- sample(1:20, 100, replace = T)
y <- rep(1:0) # Let y be a another vector: rep(1:0)
print(x + y*3) # let the odd-index elements add 3

# part b
sqrt(x) # compute the square root of each element contained by
x
```

Question Two:

Given $x = [3 \ 15 \ 9 \ 12 \ -1 \ -12 \ 9 \ 6 \ 1]$, provide the command that will \ a) set the values of x that are positive to zero \ b) set values that are multiples of 3 to 3 \ c) multiply the values of x that are even by 5 \ d) extract the values of x that are greater than 10 into a vector called y \ e) Find the index position of elements in x which are larger than 4 \

Answer:

```
x <- c(3,15,9,12,-1,-12,9,6,1)

# part a
x <- c(3,15,9,12,-1,-12,9,6,1)
x <- abs(x) # get the absolute value of every elements in x
print(x) # print out all the elements in x

# part b
x <- c(3,15,9,12,-1,-12,9,6,1)
x[which( x %% 3 == 0)] <- 3
print(3)

# part c
x <- c(3,15,9,12,-1,-12,9,6,1)
x_1 <- (x * 5) %% 2
x_2 <- x[x_1 == 0]
```

```

print(x_2)

# part d
x <- c(3,15,9,12,-1,-12,9,6,1)
y <- x[x > 10]
print(y)

# part e
i <- which(x > 4) # find out the element that suitable for the
criteria
print(i) # print them out

```

Question Three:

It is well known that the infinite series:

$$e^x = \sum_{n=0}^{\infty} \frac{x^n}{n!} = 1 + x + \frac{x^2}{2!} + \frac{x^3}{3!} + \dots + \frac{x^n}{n!} + \dots$$
 converges to e^x . Use the first 20 terms of the series to approximate e . Use vector operation **without using any loop**.

Answer:

```

x <- 1
sum(1, rep(x,19)^(1:19) / gamma(2:20))

```