HW2
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For this assignment I compared computing speed of lapply function and for loop given the same computing goal.

Brief Process: sum numbers from 1 to 10000 using 'lapply' function and 'for' loop separately; count how much time it is used to do the summation for each of the method; compare relative time of two methods.

R codes are as follows:

```r
start_time1 = Sys.time()
z <- NULL
for (i in 1:10000){
  z[i] <- z[i]+i
}
end_time1 = Sys.time()
elapsed_time1 <- as.numeric(difftime(time1 = end_time1,
                                     time2 = start_time1,
                                     units = "secs"))

start_time2 = Sys.time()
lapply(list(1:10000), sum)
end_time2 = Sys.time()
elapsed_time2 <- as.numeric(difftime(time1 = end_time2,
                                     time2 = start_time2,
                                     units = "secs"))

cat("elapsed time1 : ",sprintf("%.3f",elapsed_time1),"sec",sep="")
cat("elapsed time2 : ",sprintf("%.3f",elapsed_time2),"sec",sep="")
relative <- elapsed_time1/elapsed_time2
relative
```

Outputs are as follows:

```
> start_time1 = Sys.time()
> z <- NULL
> for (i in 1:10000){
+   z[i] <- z[i]+i
+ }
> end_time1 = Sys.time()
> elapsed_time1 <- as.numeric(difftime(time1 = end_time1,
+                                      time2 = start_time1,
+                                      units = "secs"))
>
> start_time2 = Sys.time()
> lapply(list(1:10000), sum)
[[1]]
[1] 50005000

> end_time2 = Sys.time()
> elapsed_time2 <- as.numeric(difftime(time1 = end_time2,
+                                      time2 = start_time2,
+                                      units = "secs"))
>
> cat("elapsed time1 : ",sprintf("%.3f",elapsed_time1),"sec",sep="")
elapsed time1 : 0.032sec
> cat("elapsed time2 : ",sprintf("%.3f",elapsed_time2),"sec",sep="")
elapsed time2 : 0.003sec
> relative <- elapsed_time1/elapsed_time2
> relative
[1] 10.3013
```

Result: It takes about 0.032 seconds to sum from 1 to 10000 if we use for loop, but it takes only 0.003 seconds if we use lapply function. Lapply fucntion is approximately 10 times faster than for loop under this summation task.