hyang390
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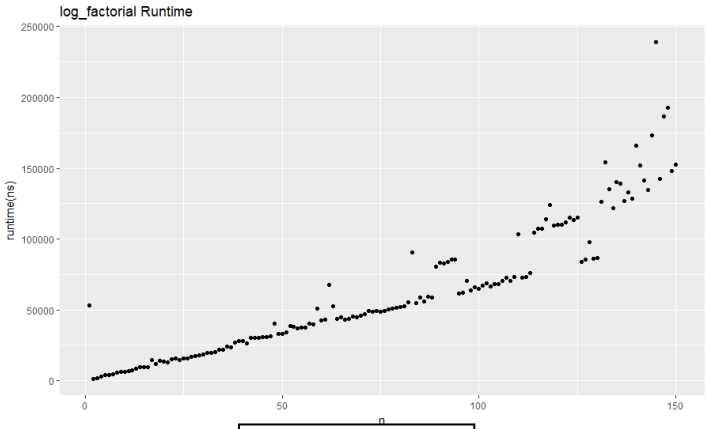
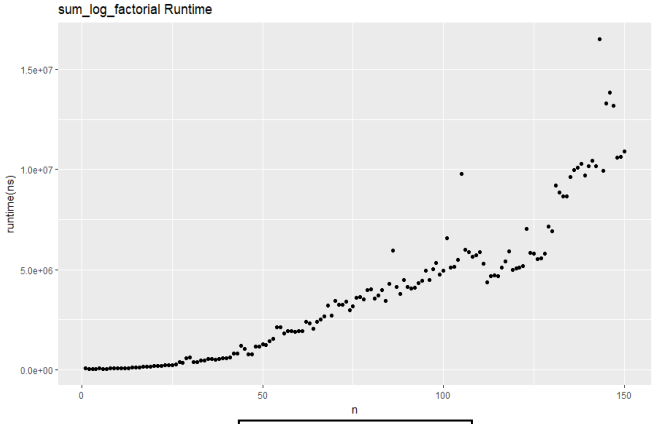
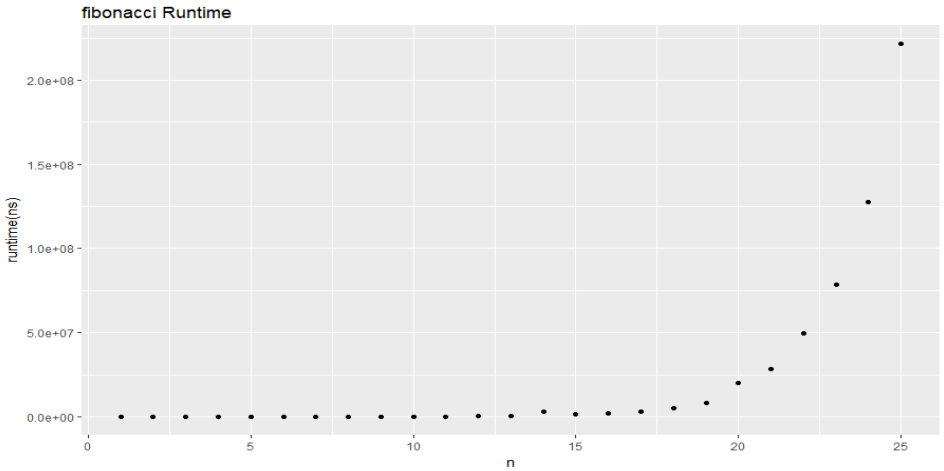
```
library(ggplot2)
library(microbenchmark)

small_ite <- 25
large_ite <- 150

fibonacci_seq <- vector(mode="numeric", length=small_ite)
log_factorial_seq <- vector(mode="numeric", length=large_ite)
sum_log_factorial_seq <- vector(mode="numeric", length=large_ite)

for (i in 1:large_ite) {
  log_factorial_seq[i] <- mean(microbenchmark::microbenchmark(log_factorial(i))$time)
  sum_log_factorial_seq[i] <- mean(microbenchmark::microbenchmark(sum_log_factorial(i))$time)
}

for (i in 1:small_ite) {
  fibonacci_seq[i] <- mean(microbenchmark::microbenchmark(fibonacci(i))$time)
}

ggplot2::qplot(x=seq(large_ite), y=log_factorial_seq, xlab="n", ylab="runtime(ns)") + ggtitle("log_factorial
Runtime")

ggplot2::qplot(x=seq(large_ite), y=sum_log_factorial_seq, xlab="n", ylab="runtime(ns)") +
ggtitle("sum_log_factorial Runtime")


ggplot2::qplot(x=seq(small_ite), y=fibonacci_seq, xlab="n", ylab="runtime(ns)") + ggtitle("fibonacci Runtime")
```



Runtime: $O(n)$



Runtime: $O(n^2)$



Runtime: $O(2^n)$