MTH208a: Assignment 5

Efficient coding

Consider a vector $x = (x_1, \dots, x_n)$, and suppose we want to calculate:

$$\frac{\log(x_i)}{\sum_{k=1}^{n} \log(x_k)}$$

The function `func` below calculates the above for a given vector `vec`.

```
func <- function(vec)
{
  n <- length(vec)

  # for tracking sum and log
  sum.log <- 0
  log.of.vec <- numeric(length(n))

  # calculating logs and sum for each element
  for(i in 1:n)
  {
    log.of.vec[i] <- log(vec[i])
    sum.log <- sum.log + log.of.vec[i]
  }

  # fraction
  frac <- log.of.vec/sum.log
  return(frac)
}
```

Write an alternative function `func2` so that when you run the following benchmark, it is *at least* 4 times faster:

```
benchmark(func(1:1e4), func2(1:1e4))
```

INSTRUCTIONS: copy and paste **ONLY** the function `func2` in your `assignment5.R` file in the GitHub repository.