Success probability

According to derived formula, let's define function to calculate probability of choosing the best candidate.

```
success_probability <- function(N, n){
  sum_of = 0
  for(i in seq(n+1, N, 1)){
    sum_of <- sum_of + 1/(i-1)
  }
  return((n/N) * sum_of)
}
```

Then, our function to define if strategy S_n is winning on given experiment

```
is_winning <- function(experiment, N, n){
  if(N %in% experiment[1:n]){
    return(F)
  }else{
    max_skipped <- max(experiment[1:n])
    for(i in n+1:N){
      if(experiment[i] > max_skipped){
        return(experiment[i] == N)
      }
    }
  }
}
```

Then, this is function to calculate empirical success probability that calculates probability of winning with error less than 0.003 with probability bigger than 95.4%

```
empirical_success_probability <- function(N, n){
  num_experiments <- 100000
  successes <- 0
  candidates <- seq(1, N, 1)
  experiments <- replicate(num_experiments, sample(candidates))
  for(ind_exp in 1:num_experiments){
    experiment <- experiments[, ind_exp]
    successes <- successes + is_winning(experiment, N, n)
  }
  return((successes/num_experiments))
}

compare_theoretical_and_practical <- function(N, n){
  return(abs(success_probability(N, n) - empirical_success_probability(N, n)))
}
```

And here's our plot that proves that the best variant of choosing the best candidate is rejecting fist $\frac{N}{e}$ candidates.

```
plot_epirical_success_probabilities <- function(N){
  num_experiments <- 100000
  candidates <- seq(1, N, 1)
  experiments <- replicate(num_experiments, sample(candidates))
  y <- c()
  for(x in 1:N){
```

```
    successes <- 0
    for(ind_exp in 1:num_experiments){
      experiment <- experiments[, ind_exp]
      successes <- successes + is_winning(experiment, N, x)
    }
    y[x] <- (successes/num_experiments)
  }
  plot(y, xlab ="number of candidates rejected", ylab = "Empirical probability of choosing best candida
}
plot_epirical_success_probabilities(100)
```