# Homework 1

## Code:

```r
> # HW 1 Empirical Probability
  # Inthat Sappipat 65011304

  options(scipen = 999) # set the display format for large numbers

  findfive <- function(s){ # create function named findfive to find the probability
                           # of getting 5 when roll a dcie s times

      output <- sample(1:6, s ,replace = T) # create a variable named output to random the number
                                            # 1 to 6 for s times like rolling a dice for s times

      event <- sum(output == 5) # create a variable named event to detect a random number that is 5
                                # and store the amount of 5 that come out when roll a dice s times

      prob <- event / s # create a variable named prob to store the probability of getting
                        # 5 when roll a dice s times

      different <- abs(prob - (1/6)) # create a variable named different to store the
                                     # difference between the probability and 1/6

      cat("rolling = ", s, "\n", "Probability of getting 5 = ", prob, "\n") # show the output of
                                                                            # number of rolls and
                                                                            # probability of
                                                                            # getting 5

      cat("Difference = ", different, "\n\n") # show the output of the difference
                                              # between the probability and 1/6
  }

  findfive(1000) # roll a dice 1000 times

  findfive(100000) # roll a dice 100000 times

  findfive(1000000) # roll a dice 1000000 times
```

## Result:

```
> findfive(1000) # roll a dice 1000 times
rolling =  1000
 Probability of getting 5 =  0.17
Difference =  0.003333333

>
> findfive(100000) # roll a dice 100000 times
rolling =  100000
 Probability of getting 5 =  0.16762
Difference =  0.0009533333

>
> findfive(1000000) # roll a dice 1000000 times
rolling =  1000000
 Probability of getting 5 =  0.166831
Difference =  0.0001643333
```

Result table:

| Number of trials (n) | Probability of getting "5" | Difference from 1/6 |
|---|---|---|
| 1,000 | 0.17 | 0.003333333 |
| 100,000 | 0.16762 | 0.000953333 |
| 1,000,000 | 0.166831 | 0.000164333 |

Conclusion:

From the experiment, if we increase the number of trials, the empirical probability seems to be closer to the classical probability. In my opinion, a large number of trials will make the empirical probability more accurate than a small number.