Exercise 4 - Sample distribution and Central Limit Theorem

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1 Task 1 Bootstap sampling

We start by initializing the given data points.

```
x <- c(4.94, 5.06, 4.53, 5.07, 4.99, 5.16, 4.38, 4.43, 4.93, 4.72, 4.92, 4.96)
```

1.1 How many possible bootstrap samples are there, if each bootstrap sample has the same size as the original?

By applying bootstrapping, we sample from our data points with retaking. This would account for $12^{12} - 1$ possible samples if we regard order. If we do not want to regard ordering of the data points (stars and bars theorem), we may look at $\binom{23}{12} = 1.352078 \times 10^6$.

1.2 Compute the mean and the median of the original sample.

```
cat("mean of original sample = ", mean(x))
```

```
## mean of original sample =  4.840833
```

```
cat("median of original sample = ", median(x))
```

```
## median of original sample =  4.935
```

1.3 Create 2000 bootstrap samples and compute their means.