

Random permutation of arrays

# Statement of the problem

Our purpose is to

- ▶ study an algorithm for randomly permuting an array, and
- ▶ compare the run times of implementations in
  1. **R**
  2. *Rcpp*
  3. the built-in `sample()` function in R.

## The algorithm

```
PERMUTE(A)
```

```
-----
```

```
n = length(A)
```

```
for (i = 1, ..., n) {
```

```
    SWAP(A, i, RANDOM(i, n))
```

```
}
```

## Implementation

The following is an R implementation of this algorithm.

```
random <- function(a, b)
{
  a + floor(runif(1) * (b-a+1))
}
```

```
permute <- function(x)
{
  n <- length(x)
  for (i in seq_along(x))
  {
    s <- random(i, n)
    x[c(i, s)] <- x[c(s, i)]
  }
  x
}
```

One example of runtime:

```
permute(1:n) #> [1] 4 2 3 5 1
```