DATA605: Fundamentals of Computational Mathematics

Discussion 10

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This power function will be used to perform repeated multiplication of our transition matrix.

```
power <- function(m, k) {
  r <- m
  for (i in 2:k) {
    r <- r %*% m
  }
  return(r)
}
```

Chapter 11.3 Exercise 5

Find the fixed probability vector w for each of the following regular matrices.

a

```
(p <- matrix(c(3/4,1/2,1/4,1/2),2,2))
```

```
##      [,1] [,2]
## [1,] 0.75 0.25
## [2,] 0.50 0.50
```

```
power(p,1000)
```

```
##           [,1]      [,2]
## [1,] 0.6666667 0.3333333
## [2,] 0.6666667 0.3333333
```

$w = (2/3, 1/3)$

b

```
(p <- matrix(c(9/10,1/10,1/10,9/10),2,2))
```

```
##      [,1] [,2]
## [1,]  0.9  0.1
## [2,]  0.1  0.9
```

```
power(p,1000)
```

```
##      [,1] [,2]
## [1,]  0.5  0.5
## [2,]  0.5  0.5
```

$w = (1/2, 1/2)$

c

```
(p <- matrix(c(3/4,0, 1/4, 1/4, 2/3, 1/4, 0, 1/3, 1/2),3,3))
```

```
##      [,1]      [,2]      [,3]
## [1,] 0.75 0.2500000 0.0000000
## [2,] 0.00 0.6666667 0.3333333
## [3,] 0.25 0.2500000 0.5000000
```

```
power(p,1000)
```

```
##           [,1]      [,2]      [,3]
## [1,] 0.2857143 0.4285714 0.2857143
## [2,] 0.2857143 0.4285714 0.2857143
## [3,] 0.2857143 0.4285714 0.2857143
```

$w = (2/7, 3/7, 2/7)$