

Now lock the door to the outside.

The transition matrix P becomes the following.

P

1/2	1/4	1/4	0	0
1/2	1/2	0	0	0
1/4	0	1/2	1/4	0
0	0	1/4	1/2	1/4
0	0	0	1/2	1/2

Here are the eigenvalues and left eigenvectors of P.

```
> eigen(t(P))
$values:
[1] 1.000000e+00 8.535534e-01 5.000000e-01 1.464466e-01 -1.665335e-16
```

```
$vectors:
      [,1]      [,2]      [,3]      [,4]      [,5]
[1,] 0.7905694 -6.123724e-01 1.387779e-17 -5.773503e-01 0.6324555
[2,] 0.3952847 -4.330127e-01 2.500000e-01 4.082483e-01 -0.3162278
[3,] 0.7905694 2.416660e-16 -5.000000e-01 -1.980789e-16 -0.6324555
[4,] 0.7905694 6.123724e-01 -1.040834e-15 5.773503e-01 0.6324555
[5,] 0.3952847 4.330127e-01 2.500000e-01 -4.082483e-01 -0.3162278
```

```
pi<-eigen(t(P))$vectors[,1]
pi<-pi/sum(pi)
```

```
> pi
[1] 0.250 0.125 0.250 0.250 0.125
>
```

Alternative computation.

```
ONE <- matrix(1,5,5)
one <- rep(1,5)
I<-diag(5)
```

```
pi<- one %*% solve(I-P+ONE)
> pi
      [,1] [,2] [,3] [,4] [,5]
[1,] 0.25 0.125 0.25 0.25 0.125
>
```

```
P2 <- P %*% P
P4 <- P2 %*% P2
P8 <- P4 %*% P4
P16 <- P8 %*% P8
P32 <- P16 %*% P16
P64 <- P32 %*% P32
P128 <- P64 %*% P64
```

```
> P8
      [,1]      [,2]      [,3]      [,4]      [,5]
[1,] 0.3204346 0.17480469 0.2500000 0.1795654 0.07519531
[2,] 0.3496094 0.19641113 0.2480469 0.1503906 0.05554199
[3,] 0.2500000 0.12402344 0.2519531 0.2500000 0.12402344
[4,] 0.1795654 0.07519531 0.2500000 0.3204346 0.17480469
[5,] 0.1503906 0.05554199 0.2480469 0.3496094 0.19641113
```

> P32

	[,1]	[,2]	[,3]	[,4]	[,5]
[1,]	0.2515752	0.1261138	0.25	0.2484248	0.1238862
[2,]	0.2522276	0.1265752	0.25	0.2477724	0.1234248
[3,]	0.2500000	0.1250000	0.25	0.2500000	0.1250000
[4,]	0.2484248	0.1238862	0.25	0.2515752	0.1261138
[5,]	0.2477724	0.1234248	0.25	0.2522276	0.1265752

> P64

	[,1]	[,2]	[,3]	[,4]	[,5]
[1,]	0.2500099	0.1250070	0.25	0.2499901	0.1249930
[2,]	0.2500140	0.1250099	0.25	0.2499860	0.1249901
[3,]	0.2500000	0.1250000	0.25	0.2500000	0.1250000
[4,]	0.2499901	0.1249930	0.25	0.2500099	0.1250070
[5,]	0.2499860	0.1249901	0.25	0.2500140	0.1250099

> P128

	[,1]	[,2]	[,3]	[,4]	[,5]
[1,]	0.25	0.125	0.25	0.25	0.125
[2,]	0.25	0.125	0.25	0.25	0.125
[3,]	0.25	0.125	0.25	0.25	0.125
[4,]	0.25	0.125	0.25	0.25	0.125
[5,]	0.25	0.125	0.25	0.25	0.125

>