PShaji_Assignment10

Priya Shaji

11/2/2019

Smith is in jail and has 1 dollar; he can get out on bail if he has 8 dollars.A guard agrees to make a series of bets with him. If Smith bets A dollars, he wins A dollars with probability .4 and loses A dollars with probability .6. Find the probability that he wins 8 dollars before losing all of his money if (a) he bets 1 dollar each time (timid strategy). (b) he bets, each time, as much as possible but not more than necessary to bring his fortune up to 8 dollars (bold strategy). (c) Which strategy gives Smith the better chance of getting out of jail?

Answer (a) he bets 1 dollar each time (timid strategy)

probability of winning A dollars: 0.4

probability of losing A dollars: 0.6

```
p <- 0.4
q <- 0.6
r <- q/p


for (i in 0:8){
ans <- round((1-r^i)/(1-r^8),4)
print (ans)
}
```

```
## [1] 0
## [1] 0.0203
## [1] 0.0508
## [1] 0.0964
## [1] 0.1649
## [1] 0.2677
## [1] 0.4219
## [1] 0.6531
## [1] 1
```

Answer (b) he bets, each time, as much as possible but not more than necessary to bring his fortune up to 8 dollars (bold strategy)

```
bold_1 <- matrix(c(1,0.6,0.6,0.6,0,0,0,0,0,0,0,0.4,0,0,0,0,0,0.4,0,0,0,0,0,0.4,1),nrow = 5, byrow=FALSE)
bold_1
```

```
##      [,1] [,2] [,3] [,4] [,5]
## [1,]  1.0    0  0.0  0.0  0.0
## [2,]  0.6    0  0.4  0.0  0.0
## [3,]  0.6    0  0.0  0.4  0.0
## [4,]  0.6    0  0.0  0.0  0.4
## [5,]  0.0    0  0.0  0.0  1.0
```

```
bold_2 <- matrix(c(0,1,0,0,0),nrow=1)
bold_2
```

```
##      [,1] [,2] [,3] [,4] [,5]
## [1,]    0    1    0    0    0
```

```
bold_3 <- bold_2 %*% bold_1
bold_3
```

```
##      [,1] [,2] [,3] [,4] [,5]
## [1,]  0.6    0  0.4    0    0
```

```
bold_4 <- bold_3 %*% bold_1
bold_5 <- bold_4 %*% bold_1
bold_5
```

```
##       [,1] [,2] [,3] [,4]  [,5]
## [1,] 0.936    0    0    0 0.064
```

Therefore, the probabity is 0.064

Answer (c) Which strategy gives Smith the better chance of getting out of jail?

The probability of bold strategy is better than timid strategy to get out of jail.