

Minimal Studying

In order to graduate from State University, Angie Warner needs to pass at least one of the three subjects she is taking this semester. She is now enrolled in Algebra, Calculus, and Statistics. Angie's busy schedule of extra-curricular activities allows her to spend only 4 hours per week on studying. Angie's probability of passing each course depends on the number of hours she spends studying for the course, as follows:

Hours of study per week	Probability of Passing		
	Algebra	Calculus	Statistics
0	.20	.25	.10
1	.30	.30	.30
2	.35	.33	.40
3	.38	.35	.45
4	.40	.38	.50

How many hours per week Angie should spend studying each subject.

Stages: Subjects $j = 0, 1, 2$ P_{aj} - prob of passing j with a hours of study.

State: hours remaining, s

Value function:

$V_j(s_j) = \min$ prob of failing subjects $j, \dots, 2$ with s_j hours available.

We want $V_0(4)$

$$V_2(s_2) = 1 - P_{s_2, 2}$$

$$V_j(s_j) = \min_{0 \leq a_j \leq s_j} \{ (1 - P_{a_j, j}) \times V_{j+1}(s_j - a_j) \}$$

↑
hours to allocate to subject j

Chess Strategy

Vladimir is playing Keith in a two-game chess match. Winning a game scores one match point and drawing a game scores a half match point. After the two games are played, the player with more match points is declared the champion. If the two players are tied after two games, they continue playing until somebody wins a game (the winner of that game will be the champion).

During each game, Vladimir can play one of two ways: boldly or conservatively. If he plays boldly, he has a 45% chance of winning the game and a 55% chance of losing the game. If he plays conservatively, he has a 90% chance of drawing the game and a 10% chance of losing the game.

What strategy should Vladimir follow to maximize his probability of winning the match?

Stages: Games t

State: Points s_t at start of game t .

Value function:

$V_t(s_t)$ = maximum prob of winning match
if we start game t with s_t points

we want $V_1(0)$.

$$\left\{ \begin{array}{l} V_3(0) = 0 = V_3(\frac{1}{2}) \leftarrow \\ V_3(2) = V_3(1\frac{1}{2}) = 1 \leftarrow \\ V_3(1) = .45 \text{ (Bold)} \end{array} \right.$$

$V_3(s)$ - max prob of winning match if
we start third game with s points.