

x_0	1	1
x_1	2	4
x_2	3	3
x_3	4	2
x_4	1	1

Leave Warrington, visit Runcorn and Frodsham and Widness and return to Warrington. Leave Warrington, visit Widness, Runcorn and Fordsham, and return to Warrington.

9.5 Planning an Electoral Campaign

Candidate Arnold Schwarzenegger has been nominated to be elected in California (USA). The funds available there come to around 10,000 (in thousands of dollars). Although the Committee in charge wishes to start the electoral campaign in the five districts in the state of California, limited funds indicate otherwise. Table 9.3 lists Schwarzenegger’s estimated voting population to win the elections in each district and the quantity of funds required to start an effective campaign in each district.

The Committee in charge of the campaign has decided that every district receives all the assigned funds or none. How can the available funds be assigned to win the election in the largest number of districts and, therefore, the largest number of total votes? Solve this problem with a dynamic programming model.

Solution

$N = 5$ districts.

State = e_n = funds available to be assigned to each district;

Decision = x_n = funds to be assigned;

V_n = Votes obtained in stage n ;

Recursive function: $f_n(e_n, x_n) = f_{n+1}^*(e_n - x_n) + V_n$

$n = 5$

Table 9.3 Electoral population and the funds needed to start campaigns

District	Voting population (thousands of people)	Funds required (thousands of \$)
1	3,100	3,500
2	2,600	2,500
3	3,500	4,000
4	2,800	3,000
5	2,400	2,000

e_5	f_5^*	x_5^*
0	0	0

$n = 4$

e_4/x_4		f_4^*	x_4^*
0	0	0	0

$n = 3$

e_3/x_3		f_3^*	x_3^*
4,000	3,500	3,500	4,000

$n = 2$

e_2/x_2		f_2^*	x_2^*
6,500	7,100	7,100	2,500

$n = 1$

e_1/x_1		f_1^*	x_1^*
10,000	3,100	9,200	3,500

The optimal solution is to assign funds to districts 1, 2 and 3 to obtain 9,200 votes.

9.6 Seeking a Study Strategy

A year 3 Business Studies student at EPSA has 7 days to prepare the final exams of four subject matters. The student wishes to determine a study strategy which maximises the total marks obtained in all the subject matters. To do this, the student has checked the content of these subject matters and has estimated the