	x_1	x_2	x_3	C_1	C_2	C_3	C_4
$v_1 =$	1	0	0	1	0	0	1
$v_1' =$	1	0	0	0	1	1	0
$v_2 =$	0	1	0	0	0	0	1
$v_2' =$	0	1	0	1	1	1	0
$v_3 =$	0	0	1	0	0	1	1
$v_3' =$	0	0	1	1	1	0	0
$s_1 =$	0	0	0	1	0	0	0
$s_1' =$	0	0	0	2	0	0	0
$s_2 =$	0	0	0	0	1	0	0
$s_2' =$	0	0	0	0	2	0	0
$s_3 =$	0	0	0	0	0	1	0
$s_3' =$	0	0	0	0	0	2	0
$s_4 =$	0	0	0	0	0	0	1
$s_4' =$	0	0	0	0	0	0	2
$t =$	1	1	1	4	4	4	4

Figure 34.19 The reduction of 3-CNF-SAT to SUBSET-SUM. The formula in 3-CNF is $\phi = C_1 \wedge C_2 \wedge C_3 \wedge C_4$, where $C_1 = (x_1 \vee \neg x_2 \vee \neg x_3)$, $C_2 = (\neg x_1 \vee \neg x_2 \vee \neg x_3)$, $C_3 = (\neg x_1 \vee \neg x_2 \vee x_3)$, and $C_4 = (x_1 \vee x_2 \vee x_3)$. A satisfying assignment of ϕ is $(x_1 = 0, x_2 = 0, x_3 = 1)$. The set S produced by the reduction consists of the base-10 numbers shown; reading from top to bottom, $S = \{1001001, 1000110, 100001, 101110, 10011, 11100, 1000, 2000, 100, 200, 10, 20, 1, 2\}$. The target t is 1114444. The subset $S' \subseteq S$ is lightly shaded, and it contains v_1', v_2', and v_3, corresponding to the satisfying assignment. It also contains slack variables s_1, s_1', s_2', s_3, s_4, and s_4' to achieve the target value of 4 in the digits labeled by C_1 through C_4.

and that either x_i or $\neg x_i$ appears in some clause, and so there must be some clause C_j for which v_i and v_i' differ.

- For each clause C_j, there are two integers, s_j and s_j' in S. Each has 0's in all digits other than the one labeled by C_j. For s_j, there is a 1 in the C_j digit, and s_j' has a 2 in this digit. These integers are "slack variables," which we use to get each clause-labeled digit position to add to the target value of 4.

Simple inspection of Figure 34.19 demonstrates that all s_j and s_j' values in S are unique in set S.

Note that the greatest sum of digits in any one digit position is 6, which occurs in the digits labeled by clauses (three 1's from the v_i and v_i' values, plus 1 and 2