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CS236 AI Lab Assignment  
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1. Formulate the following problems and solve them using local search algorithms (Hill climbing, Beam Search) and GA.
  1. Given a set of non-negative integers and a value sum, determine if there is a subset of the given set with a sum equal to a given sum.
  2. Given a knapsack with a weight limit of  $W$ , a collection of  $n$  items  $x_1, x_2, x_3, \dots, x_n$  with values  $v_1, v_2, v_3, \dots, v_n$  and weights  $w_1, w_2, w_3, \dots, w_n$ , the knapsack problem is defined as the optimization problem:

$$\text{Maximize } \sum_{i=1}^n x_i v_i$$

$$\text{s.t. } \sum_{i=1}^n x_i w_i \leq W$$

$$x_i \in \{0, 1\}, \forall i = 1, 2, \dots, n$$

3. given a universe  $\mathcal{U}$  and a family  $\mathcal{S}$  of subsets of  $\mathcal{U}$ , a cover is a subfamily  $\mathcal{C} \subseteq \mathcal{S}$  of sets whose union is  $\mathcal{U}$ . The task is to find a set covering that uses the fewest sets.