1. **Algorithm**

   Guess the most expensive pump i^* used by the optimal solution and discard all items of cost more than w_i^*. Then, sort the rest of the pumps by $\frac{w_i}{s_i}$. Start from the most economic item, we pick until the total number of gallons exceeds D. The algorithm is guaranteed to yield some feasible solution because pumps we discard are not in an optimal solution.

2. **The algorithm is a 2-approximation.**

   Suppose that, adding ith pump in the sorted sequence of pumps will result in the total gallons exceeding D. Suppose that it has s_i and w_i. Because the greedy algorithm ensures that each solution to a subproblem is most "dense, " by the time the greedy algorithm is about to add the ith pump, the total gallons is less than or equal to that in an optimal solution. As for the ith pump, w_i is less than the optimal because it is a part of that solution. The approximation result is the sum of the total gallons before the ith pump and w_i, each of which is less than an optimal. Therefore, the approximation generates a result within twice the optimal.