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**Algorithm 4.1** GREEDY

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*Input.* Integer  $W$ , vectors  $c, w \in \mathbb{N}^n$  with  $w_j \leq W$ ,  $\sum_j w_j > W$ , and  $c_1/w_1 \geq \dots \geq c_n/w_n$ .

*Output.* Vector  $x \in \{0, 1\}^n$  such that  $\text{weight}(x) \leq W$ .

Step 1. Define  $k = \min\{j \in \{1, \dots, n\} : \sum_{i=1}^j w_i > W\}$ .

Step 2. Let  $x$  and  $y$  be the following two vectors:  $x_j = 1$  for  $j = 1, \dots, k-1$ ,  $x_j = 0$  for  $j = k, \dots, n$ ,  
and  $y_j = 1$  for  $j = k$ ,  $y_j = 0$  for  $j \neq k$ .

Step 3. Return  $x$  if  $\text{val}(x) \geq \text{val}(y)$ ; otherwise  $y$ .

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