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**Algorithm 1:** BRANCH AND PRICE

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**Data:** data file,  $\Omega$ , finished-boolean, duals-float

**Result:**  $\Omega_1 \subset \Omega$ , solution

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1 begin
2    $\Omega_1 \leftarrow \text{Initial Heuristic}(\Omega)$ 
3    $\text{duals} \leftarrow \emptyset$ 
4    $\text{solution} \leftarrow \emptyset$ 
5   repeat
6      $\text{duals} \leftarrow \text{Solve Master}(\Omega_1)$ 
7      $\text{finished} \leftarrow \text{true}$ 
8     for  $i \in N$  do
9        $\text{temp} \leftarrow \text{solve Sub problem}(i, \text{duals})$ 
10      if  $\text{reduced Cost}(\text{temp}) < 0$  then
11         $\Omega_1 = \Omega_1 \cup \text{temp}$ 
12         $\text{finished} \leftarrow \text{false}$ 
13       $\perp$ 
14    until  $\text{finished}$ 
15     $\text{solution} \leftarrow \text{solve Master}(\Omega_1)$ 
16    if  $\text{solution} \notin Z$  then
17       $\text{ub} \leftarrow \text{Solve Master}(\Omega_1, \text{integral})$ 
18      if  $\text{solution} = \text{ub}$  then
19         $\perp$ 
20       $\perp$ 
21     $\text{solution} \leftarrow \text{branch and bound}(\text{solution})$ 
22   $\text{solution}$ 
23
24
25
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