Algorithm 5.1 PRIMAL-DUAL SET COVER

Input.   Universe U with n elements, collection $\mathcal{S} = \{S_1, \ldots, S_k\}$, $S_i \subseteq U$, a cost function $c : \mathcal{S} \to \mathbb{R}$.

Output. Vector $x \in \{0, 1\}^k$

Step 1. $x = 0$, $y = 0$.

Step 2. Until all elements are covered, do:

    (a) Pick an uncovered element, say e, and raise y_e until some set goes tight.

    (b) Pick all tight sets in the cover and update x.

    (c) Declare all the elements occuring in these sets as covered.

Step 3. Return x.