

**Algorithm Design**  
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**Solution of Exercise C-13.14**

Use the hint. That is, suppose we are given an instance  $G$  to the Hamiltonian cycle problem. Construct a complete graph  $H$  on the  $n$  vertices of  $G$  and weight these edges so that an edge of  $H$  also in  $G$  has cost 1 but an edge of  $H$  not in  $G$  has cost  $1 + \delta n$ . Note that if we include even just one of these edges in a cycle, then the cost of that cycle is at least  $n + \delta n = (1 + \delta)n$ . Thus, if we ask for a strict  $(1 + \delta)$ -approximation of a TSP of cost  $n$ , this can only be achieved using original edges of  $G$  that form a Hamiltonian cycle.