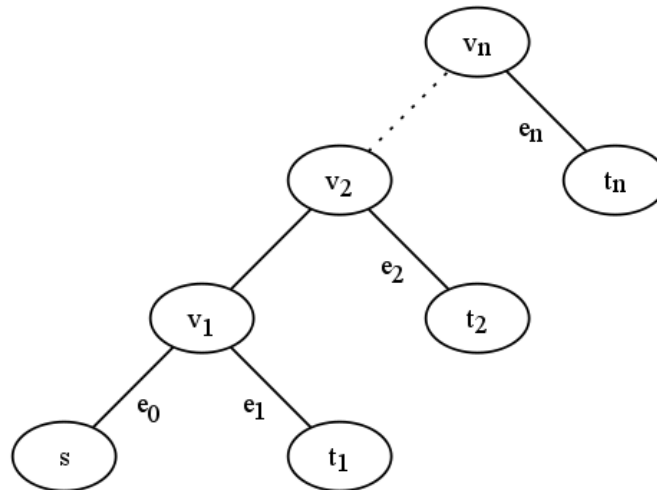


Homework 8

Problem 18.5

If Step 4 in Algorithm 18.4 is removed, or is changed to a forward delete, show that its approximation factor is unbounded.

Consider the following graph:



Let the costs of e_0, \dots, e_n be all set to 1. Let the costs of the remaining edges be greater than 1. Obviously, the optimal solution is cutting only e_0 for a cost of 1. The algorithm iterates from v_1 to v_n , adding $e_0, e_1 \dots e_n$ to D . Without deletion, this gives a cost of $n + 1$. With forward delete, assume the unlucky choice of deleting e_0 first. This leaves $e_1 \dots e_n$ all necessary for the multicut, yielding a solution with total cost n . Thus, without reverse delete this becomes arbitrarily large.