(a)

No, the Earliest Deadline First greedy algorithm cannot guarantee to produce the optimal schedule for this objective.

A counterexample: Consider a job with $t_1 = 2; t_2 = 2$, and another job with $t_2 = 5; d_2 = 1$. If we use the Earliest Deadline First greedy algorithm, the second job ($t_2 = 5; d_2 = 1$) will be scheduled first. However, in this case, in terms of the sum of the lateness, when we place the second job first, the sum of the lateness should be $(5-1)+(5+2-2) = 9$; When we place the first job first, the summation should be $5+2-1 = 6 < 9$, so the first job will be scheduled first, which gives a different result.

(b)

Yes, this algorithm will gurantee the optimal solution.

Proof: Denote the number of jobs that are not overdue using the algorithm be i. Suppose there is anouther solution that the number of jobs not overdue is j. We would like to prove that i will always be greater or equal to j ($i \geq j$)

If $n = 1$, there will only be one solution and $i = j$, so $i \geq j$ works.

If $n \geq 2$, we use contradictory and assume $i \leq j$. According to the algorithm, before job i being placed, all jobs placed after the current ones should be within deadline. Denote the sum of the duration of first k jobs as S_k.

$$t_1 + t_2 + \cdots + t_i + t_{i+1} + \cdots + t_n = S_n \tag{1}$$

$$t_1 + t_2 + \cdots + t_i \leq d_i \tag{2}$$

$$\begin{array}{ll} \text{when } k < i & S_{k-1} + t_k < d_k \\ \text{when } k > i & S_{k-1} + t_k > d_k \end{array} \tag{3}$$

If there exists $i < j$, $S_{j-1} + t_j > d_j$, then $S_{j-1} + t_j > d_j$, so there must be at least one job overdued. Hence, there cannot be j jobs finished on time, which contradicts the assumption that $i < j$. Hence, $i \geq j$, which indicates that this algorithm is guaranteed to produce the optimal solution.