1 The Simplex Solver

C, C' are conjunctions of equations;
i, j, m are integers;
$a_{ij}, b_i, e, d'_i, a'_i$ are constants;
f, f', f_i are linear expressions;
c_i, c'_i are equations;
x_i are variables, z_i are new variables;
$flag$ is either $true$ or $false$.

simplex_solve(C)
    let C be of the form $c_1 \wedge \cdots \wedge c_n$

    for each $i \in \{1, \ldots, n\}$
        let c_i be of the form $b_i = \sum_{j=1}^{m} a_{ij} x_j$ where $b_i \geq 0$
        $f_i := b_i - \sum_{j=1}^{m} a_{ij} x_j$
        $c'_i := (z_i = f_i)$
    endfor

    $f := \sum_{i=1}^{n} f_i$

    $\langle flag, C', f' \rangle := $ simplex_opt($\wedge_{i=1}^{n} c'_i, f$)

    let f' be of the form $e + \sum_{j=1}^{n} d'_j z_j + \sum_{i=1}^{m} a'_i x_i$

    if $e \equiv 0$ **then**
        return $true$
    else return $false$
    endif