Joy of Pokémon Observation

Problem author and developer: Vitaly Goldshtein

For a single species ($s = 1$) in the habitat the answer is 1 if $t \mod l_1 = 0$ and 0 otherwise.

For two species ($s = 2$) in the habitat the problem is to count the number of combinations of $i_a \geq 0$ and $i_b \geq 0$ that $a \times i_a + b \times i_b = t$ (where $a = l_1$ and $b = l_2$). Let $i_a = k_a \times b + j_a$ where $0 \leq j_a < b$. Iterate over j_a and let $R = t - j_a * a$. In case $R \mod b = 0$, we should add to the answer number of combinations of k_a and i_b that $k_a \times a + i_b = \frac{R}{b}$. Or to find the number of k_a so that $k_a \times a \leq \frac{R}{b}$. I. e. we need to add to the result $\lfloor \frac{R/b}{a} \rfloor + 1$.

For three species ($s = 3$) in the habitat the problem is to count the number of combinations of $i_a \geq 0$, $i_b \geq 0$ and $i_c \geq 0$ that $a \times i_a + b \times i_b + c \times i_c = t$ (where $a = l_1$, $b = l_2$ and $c = l_3$). Let $i_a = k_a \times c + j_a$ and $i_b = k_b \times c + j_b$ where $0 \leq j_a < c$ and $0 \leq j_b < c$. Iterate over j_a and j_b and let $R = t - j_a * a - j_b * b$. In case $R \mod c = 0$, we should add to the answer number of combinations of k_a, k_b and i_c that $k_a \times a + k_b \times b + i_c = \frac{R}{c}$. Or to find the number of k_a and k_b so that $k_a \times a + k_b \times b \leq \frac{R}{c}$. Let $k_a = r_a \times b + e_a$ (where $0 \leq e_a < b$). Iterate over e_a and let $\hat{R} = \frac{R}{c} - e_a \times a$. So we need to add to the result the number of combinations of r_a and k_b, so that $r_a \times a + k_b \leq \lfloor \frac{\hat{R}}{b} \rfloor$. Let $\bar{R} = \lfloor \frac{\hat{R}}{b} \rfloor$. That can be computed using an arithmetic progression $\sum_{r_a=0}^{\lfloor \bar{R}/a \rfloor} \bar{R} - r_a \times a$.