1116-05-2008 **Bobby C. Shen*** (`runbobby@mit.edu`). *The Parametric Frobenius Problem.*

The Frobenius number of relatively prime positive integers $a_1, \ldots, a_n$, which we denote by $F(a_1, \ldots, a_n)$, is the largest integer that is not a nonnegative integer combination of the a_i. We extend this to all positive integers: let $F(a_1, \ldots, a_n)$ be the largest multiple of $\gcd(a_1, \ldots, a_n)$ which is not a nonnegative integer combination of the a_i. We consider a parametric version of the Frobenius problem. Let $P_1, \ldots, P_n$ be polynomials from $\mathbb{Z}$ to $\mathbb{Z}$ with positive leading coefficients, and let $Q(t) = F(P_1(t), \ldots, P_n(t))$, which is defined for sufficiently large integers t. We prove that this function is eventually quasi-polynomial; Q is eventually quasi-polynomial if there exists a positive integer d and polynomials $R_0, \ldots, R_{d-1}$ such that for such that for sufficiently large t, $Q(t) = R_{t \pmod d}(t)$. We do so by forming a parametric integer linear program whose optimum value at t equals $Q(t)$ for sufficiently large t. Using these ideas, one can show that if $n > 1$ and p, m are positive integers, then the p^{th} largest multiple of $\gcd(a_1, \ldots, a_n)$ which is a nonnegative integer combination of the a_i in less than m ways is eventually quasi-polynomial in t (not in the presentation). (Received September 22, 2015)