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Approximately Counting Semismooth Integers

An integer n is (y,z)-semismooth if $n = pm$ where m is an integer with all prime divisors $\leq y$ and p is 1 or a prime $\leq z$. Large quantities of semismooth integers are utilized in modern integer factoring algorithms, such as the number field sieve, that incorporate the so-called *large prime* variant. Thus, it is useful for factoring practitioners to be able to estimate the value of $\Psi(x,y,z)$, the number of (y,z)-semismooth integers up to x, so that they can better set algorithm parameters and minimize running times, which could be weeks or months on a cluster supercomputer. In this talk, we explore several algorithms to approximate $\Psi(x,y,z)$ using a generalization of Buchstab's identity with numeric integration.