1116-33-2241 **Neil M Bickford*** (techie314@gmail.com), 4509 Thistle Drive, San Jose, CA 95136, and **Ralph William Gosper** (billgosper@gmail.com), 12625 La Cresta Drive, Los Altos Hills, CA 94022.

Special and limiting values of the Weber function and Dedekind η.

We present a new method for computing exact values of the Dedekind eta function and the closely related Weber function. Specifically, by working with ratios of Dedekind eta functions, we're able to compute $\eta(2\tau)$, $\eta(-2/\tau)$, and $\eta(\tau+2)$ from $\eta(\tau)$. This allows us to compute $f(\tau)$ for dyadic complex numbers in the upper half-plane. We also extend this method to compute values of the Weber function for a wide class of imaginary quadratic surds, such as $\frac{\eta(\frac{7+\sqrt{-15}}{8})}{\eta(\frac{7+\sqrt{-15}}{4})} = \frac{\sqrt[12]{-33+11\sqrt{5}-i\left(9\sqrt{15}-15\sqrt{3}\right)}}{\sqrt[6]{2}}$ Finally, we find an asymptotic formula for the behavior of η close to the real line, as well as a few other special values using PSLQ and other empirical methods. (Received September 22, 2015)