As demonstrated in class, when finding $\sqrt{N}$:

$$\delta = \frac{1}{2}\left(G - \frac{N}{G}\right)$$

and when finding $\sqrt[3]{N}$:

$$\delta = \frac{1}{3}\left(G - \frac{N}{G^2}\right)$$

When using the algorithm to find $\sqrt[n]{N}$, we want to interpolate between G and N/G^{n-1} .
To obtain a value for δ :

$$G^{n-1} = (N^{1/n} + \delta)^{n-1}$$

$$(N^{1/n} + \delta)^{n-1} = N^{(n-1)/n} + \ldots + \delta^{n-1}$$

$$\frac{N}{N^{(n-1)/n} + \ldots + \delta^{n-1}} = N^{1/n} - (n-1)\delta + \ldots$$

$$\frac{N}{G^{n-1}} \approx N^{1/n} - (n-1)\delta$$

$$\frac{N}{G^{n-1}} - G = -n\delta$$

Therefore, $\delta = \frac{1}{n}\left(G - \frac{N}{G^{n-1}}\right)$