We give exact formulas for the growth of the ideal $A\lambda$ for $\lambda$ a quadratic element of the algebra of Boolean functions $A = \mathbb{F}_2[x_1, \ldots, x_n]/(x_1^2 + x_1, \ldots, x_n^2 + x_n)$ over the Galois field $\mathbb{F}_2$. That is, we calculate $\dim A_k\lambda$ where $A_k$ is the subspace of elements of degree less than or equal to $k$. For instance, if $\lambda = x_1x_2 + \cdots + x_{n-1}x_n$, then

$$\dim A_k\lambda = \begin{cases} 
\delta(n, k), & \text{if } 0 \leq k < n/2 \\
\delta(n, k) - (\epsilon(k - n/2) + 1)2^{\frac{n}{2}-1}, & \text{if } n/2 \leq k \leq n
\end{cases}$$

where $\delta(n, k) = \sum_{i=0}^{[k/4]} \binom{n}{k-4i} + \sum_{i=0}^{[(k-1)/4]} \binom{n}{k-1-4i}$ and $\epsilon(k) = \cos\left(\frac{k\pi}{2}\right) + \sin\left(\frac{k\pi}{2}\right)$. These results clarify some of the assertions made in a recent article of Yang and Chen concerning the efficiency of the XL algorithm in cryptography. (Received September 22, 2009)