Q2

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Answer:

We substitute $y = x^{100}$ in $P(x)$ to reduce it to $P'(y) = A_0 + A_1y + A_2y^2$. Let us say the $Q'(k)$ is the square of $P'(y)$. Clearly, the degree of $Q'(k)$ is 4 so that we need 5 of its values to uniquely determine $Q'(k)$, we take $x = -2, -1, 0, 1, 2$ to evaluate $p'(y)$, then we obtain the coefficients of $Q'(k)$ from these 5 values, by solving the corresponding system of linear equation in coefficients $B_0, \cdots, B_4$ such that $Q'(k) = B_0 + B_1k + \cdots + B_4k^4$. Finally, we substitute back y with x^{100} to obtain $Q(x) = \left(P(x)\right)^2$. This algorithm will take only 5 large integer multiplications.