1. Let $C(n)$ denote the number of bit operations need for computing the cube of an $n$-bit integer. Prove that $M(n) = O(C(n))$.

2. Let $I(n)$ denote the number of bit operations needed for computing the first $n$ bits of the inverse of a positive integer. Prove that $M(n) = O(I(n))$.

3. Let $F$ be a finite field. Give an $O(n \log n \log \log n)$-algorithm for polynomial multiplication over $F$ for the case of $\text{char } F \neq 2$ and for the case of $\text{char } F = 2$. 