1. Compute the square of the following polynomial using the Fourier transform method discussed in class.

$$p(x) \quad = \quad 2x^3 + 4x^2 + x + 3$$

   Use $\omega = (1+i)/\sqrt{2}$ as primitive 8th root of unity, where $i = \sqrt{-1}$.

2. In the exercises for unit 3 we considered the so-called "$a + b \neq c$"-problem. Recall that it takes as input three sorted sets A, B, C of $\Theta(n)$ numbers each and asks whether for all $a \in A$, $b \in B$, and $c \in C$ we have $a + b \neq c$.

   For a model of computation that allowed only comparisons (or queries) of the form $x+y < z$, $x + y > z$, or $x + y = z$ with $x \in A$, $y \in B$, and $z \in C$, but no other operations, you proved a lower bound of $\Omega(n^2)$ for the worst case time for solving this problem. This lower bound actually even holds if all the numbers involved are integers from $[0..M]$ with $M = \Theta(n)$.

   Show that if arithmetic operations are allowed and the members of A, B, C are integers from the range $[0..M]$ with $M = \Theta(n)$, then it is possible to solve this problem in $O(n \log n)$ time.