## Question 2

Let , therefore . This problem could be described in such way

The square of the polynomial of degree 2 is a polynomial of degree 4. Therefore, we need 5 inputs to uniquely determine

Substitute n into and compute all five results. This procedure would be done in linear time as it only involves addition and multiple with constant which is also basically addition. For example, involves 1+2\*1+4\*1=7 times addition.

**Then, we perform 5 times large number multiplication that generate 5 values of with substituting into** . We now use the results of to solve the linear equations and produce the expression of coefficient of . The expression of is linear combination of the 5 values of . Therefore, we can get the value of each coefficient in linear time. Finally, we substitute back to and compute the result.

In total, we have only performed 5 large integer multiplications.