

## CS345: Assignment 8

Q1. Design an algorithm to compute the product of  $n$ -bit numbers using reciprocation operation and addition operation but not using multiplication and squaring.

Q2. Design an algorithm to square a polynomial of degree  $n-1$  using only reciprocation operation and addition operation but not using multiplication and squaring.

Q3. Design an algorithm to compute the product of two  $n-1$  degree polynomials using only squaring and addition operations but not using multiplication and reciprocation operations.

Q4. Modify the algorithm described in the class to compute the reciprocal of  $P$  (without extending  $P$  to a power of 2 bit number) where  $P$  is an  $n$  bit number and  $n$  is an arbitrary positive number. Let  $n_1 = \lceil n/2 \rceil$ , and  $n_2 = \lfloor n/2 \rfloor$ . Let  $P_1$  denote the number formed by the  $n_1$  most significant bits of  $P$ , and  $P_2$  denote the number formed by the  $n_2$  least significant bits of  $P$ . Show complete analysis of error.

Q5. Modify the algorithm described in the class to compute the reciprocal of an  $n-1$  degree polynomial  $p(x)$  where  $n$  is an arbitrary positive integer. Define  $n_1, n_2, p_1, \text{ and } p_2$  in the similar fashion as in Q4.