

**MATH 467 FACTORIZATION AND PRIMALITY  
TESTING, FALL 2023, PROBLEMS 10**

*Return by Monday 13th November*

Submit any code you write to answer these questions.

1. For each number below

(i)  $n = 37038381852397$ ,

(ii)  $n = 1543267864443420616877677640751301$ ,

(iii)  $n = 23456789023456789923456789923454566777888990189$ ,

(iv)  $n = 2447952037112100847479213118326022843437705003126289$ ,

(v)  $n = 59545797598759584957498579859585984759457948579595794859456799501$ ,

list the odd primes  $p \leq 200$  for which  $n$  is a quadratic residue modulo  $p$ .

2. Let  $n$  be as in (i) above. List the  $x$  with  $6085000 \leq x \leq 6087000$  for which  $|x^2 - n|$  completely factorises into primes  $p \leq 200$  and in each case give the factorisation.