

## EE2302 Foundations of Information and Data Engineering

### Assignment 4

**Due: 6 pm, Oct 6 (Thu)**

Full mark: 12 points

1. (3 marks) Use the quotient-remainder theorem with  $d = 3$  to prove that the square of any integer has the form  $3k$  or  $3k+1$  for some integer  $k$
2. (3 marks) Find the value of  $\phi(560)$ . Show your steps.
3. (3 points) Use the Euclidean algorithm to compute  $\gcd(46288, 2046)$ . Show your steps.
4. (3 marks) Use the extended Euclidean algorithm to find  $\gcd(10245, 1689)$  and a solution in integers to the equation
$$10245x + 1689y = \gcd(10245, 1689).$$
Show your steps.

### Programming exercise (not to be handed in)

5. Use python, C++, or any other general-purpose programming language to write a computer program to compute  $\gcd(a, b)$ , where  $a$  and  $b$  are positive integers.