Assignment [redacted] 5 (31 mks)

Attempt all questions

Show your working clearly (Plagiarism will be penalized).

1) Identify a key importance of modular arithmetic (1 mk)
2) State the Chinese remainder theorem and identify a use of the theorem (cut and paste work will score zero). (2 mks)
3) Evaluate the following: (5 mks)
   a) $5 \; mod \; 11 + 2 \; mod \; 11$
   b) $23 \; mod \; 5 + 43 \; mod \; 5$
   c) $45 \times_{17} 345$
   d) $891 \times_{5} 237$
   e) $56 +_{13} 184$
4) Determine the gcd of the following using the Euclidean algorithm (show all the steps). (6 mks)
   a) 586 and 2684
   b) 10246 and 2379
5) Solve the following linear congruences (6 mks)
   a) $13x \equiv 5 \bmod 41$
   b) $17x \equiv 23 \bmod 371$
6) Express the gcd of the following pairs of numbers as a linear combination of the pair (6 mks)
   a) 286 and 1462
   b) 16524 and 17893

7.) Find the multiplicative inverse of

(a) 11 mod 539

(b) 129 mod 1137