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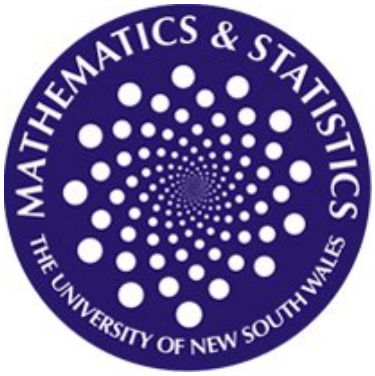

University of New South Wales

School of Mathematics and Statistics

Assignment

Number Theory

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Question 1

Part a

Use the character table given in lectures for $\mathbb{Z}_5$, extended to a Dirichlet character,to evaluate

$$\sum_{i=1}^{4} \chi_i(n)\overline{\chi_i(b)}, \qquad \text{for each } b \in \mathbb{U}_5.$$

Part b

Use the results of (a) to prove, in detail, that there are infnitely many primes congruent to 1 mod 5, 2 mod 5, and 3 mod 5 and 4 mod 5.

Solution

Part a

Part b