Number Theopry HW4 - Part 1

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Solution 1

Solution 2

Solution 11

a:

b: $q|3^p + 1 \implies 3^p \equiv -1(modq)$

Solution 12

From Fermat's Little Theorem we know that $a^{p-1} \equiv 1(modp)$. In our case it will be $3^{100} \equiv 1(mod101)$ since 101 is a prime number.
We also know that:
$3^{32,123,878,237,982,731,602} = 3^2 \times 3^{32,123,878,237,982,731,600} = 3^2 \times (3^{100})^{321,238,782,379,827,316}$
$(3^{100})^{321,238,782,379,827,316} \equiv 3^2 \times 1^{321,238,782,379,827,316}(mod101) \equiv 9(mod101)$

Solution 13

a: $1234 = 2^{10} + 2^7 + 2^6 + 2^4 + 2^1$