November 1, 1941

Dear Hardy,

Thanks for your letter. I am glad to know that the odd fact I have found is at present just an odd fact, and is not obvious from any standpoint yet familiar. One direction in which I had allowed myself to speculate is that

\[ 513 \cdot 512 + 1 = 262657 \]

and that this is a factor of \(2^{513} - 1\), since it is a factor also of \(2^{27} - 1\). Consequently an analogous, though not an identical, situation would be produced if there were a prime \(p\) such that \(p^{19} - 1\) were divisible by 262657. Possibly, however, the analogy is too weak a one to be worth pursuing.

I clearly have not yet grasped the effective working ideas for this sort of problem, since I cannot see any general method even for the following problem, which I guess must surely be soluble, namely, if \(p\) is a prime, to choose \(p + 1\) out of \(p^2 + p + 1\) objects in a ring so that all distances occur once only. One might hope that this would be easier than the corresponding problem when a power of a prime is substituted for \(p\).

Yours sincerely,