Project Euler Problem 51

By replacing the 1st digit of \*3, it turns out that six of the nine possible values: 13, 23, 43, 53, 73, and 83, are all prime.

By replacing the 3rd and 4th digits of 56\*\*3 with the same digit, this 5-digit number is the first example having seven primes among the ten generated numbers, yielding the family: 56003, 56113, 56333, 56443, 56663, 56773, and 56993. Consequently 56003, being the first member of this family, is the smallest prime with this property.

Find the smallest prime which, by replacing part of the number (not necessarily adjacent digits) with the same digit, is part of an eight prime value family.

For an 8-prime family as described in the problem we need 7 digits from the set:

If we adopt a convention that each element of A represents the corresponding member of the eight prime value family then the family itself is a subset of A containing 7 elements.

Any subset of A containing 3 elements is going to have at least one element representing a prime in any and all eight prime value family.