

## Prime pair sets

### [Problem 60 \(http://projecteuler.net/problem=60\)](http://projecteuler.net/problem=60)

The primes 3, 7, 109, and 673, are quite remarkable. By taking any two primes and concatenating them in any order the result will always be prime. For example, taking 7 and 109, both 7109 and 1097 are prime. The sum of these four primes, 792, represents the lowest sum for a set of four primes with this property.

### Solution

```

In [1]: ► def prime(m=0):
    if m > 2:
        yield 2
    if m > 3:
        yield 3
    p, n, q = 5, 3, 9
    while (not m) or (p < m):
        if all(p % x for x in range(3, n+1, 2)):
            yield p
        p += 2
        while p>q:
            q += n
            n += 1
            q += n

    ptable = list(prime(10000))

    def isprime(n):
        if n <= ptable[-1]:
            return n in ptable
        q = int(n ** 0.5) + 1
        for x in ptable:
            if n % x == 0:
                return False
            if x > q:
                return True
        if q>ptable[-1]:
            for x in range(ptable[-1],q,2):
                if n % x == 0:
                    return False
            return True
        return True

    def gen_set(lst, num, mx=None):
        num -= 1
        if mx is None:
            mx = []
        limit = lst.index(mx[-1]) if mx else len(lst)
        for x in lst[num:limit]:
            if all(isprime(int(str(x)+str(y))) and isprime(int(str(y)+str(x)))
                if num:
                    for y in gen_set(lst, num, mx+[x]):
                        yield y + [x]
                else:
                    yield [x]

    nt = []+ptable
    nt.remove(2)
    nt.remove(5)

    five = next(gen_set(nt,5))
    print(sum(five))

```

26033