1) $66 = 5 + 61 = 7 + 59 = 13 + 53 = 19 + 47 = 23 + 43 = 29 + 37$.
$96 = 7 + 89 = 13 + 83 = 17 + 79 = 23 + 73 = 29 + 67 = 37 + 59 = 43 + 53$.

2) 11, 13, 15, 17; 101, 103, 105, 107, 109.

3) (b) $1234 = 2 \cdot 617$, $10140 = 2^2 \cdot 3 \cdot 5 \cdot 13^2$, $36{,}000 = 2^5 \cdot 3^2 \cdot 5^3$.

Problems

For any positive number n, it can be shown that there exists an even integer a that is representable as the sum of two odd primes in n different ways. Confirm that the integers 66, 96, and 108 can be written as the sum of two primes in six, seven, and eight ways, respectively.

Find a set of four consecutive odd integers of which three are primes, and a set of five consecutive odd integers of which four are primes.

(a) Find all prime numbers that divide 40! (recall that $40! = 1 \cdot 2 \cdot 3 \cdot 4 \cdots 40$).

(b) Find the prime factorization of the integers 1234; 10,140; and 36,000.