Homework 10

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You may post my answers.

1. Suppose finite number of primes

$p_1, p_2, \cdots, p_n$

consider $p = p_1 p_2 \cdots p_n + 1$

always has remainder 1 when divided by p

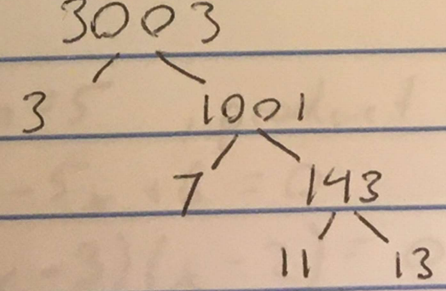
Must be prime or div. by num $> p_n$ contradiction

There must be an infinite supply.

(removed all even and div 5's)

2. 2, 3, ~~5~~, 7, ~~9~~, 11, 13, 17, ~~19~~, ~~21~~, 23, ~~25~~, ~~27~~, 29,
31, ~~33~~, 37, ~~39~~, 41, 43, 47, ~~49~~, ~~51~~, 53, ~~55~~, ~~57~~, ~~59~~,
61, ~~63~~, 67, ~~69~~, 71, 73, ~~75~~, 79, ~~81~~, 83, ~~85~~, 89, ~~91~~,
~~93~~, 97, ~~99~~, 101, 103, 107, 109, ~~111~~, 113, ~~115~~, ~~117~~,
~~121~~, ~~123~~, 127, 129, 131, ~~133~~, 137, 139

3.



$3003 = 3 \cdot 7 \cdot 11 \cdot 13$

4. $p_n \approx n \ln(n)$

$n \ln(n) = e^{100}$

$n = 2.817 \cdot 10^{41}$

roughly $2.817 \cdot 10^{41}$ primes $\leq e^{100}$