

51. Prove or disprove that $n^2 - 79n + 1601$ is prime, whenever n is a positive integer.

$$f(n) = n^2 - 79n + 1601$$

- $f(1) = 1^2 - 79 + 1601 = 1523$ (prime)
- $f(2) = 2^2 - 79 \cdot 2 + 1601 = 1447$ (prime)
- $f(3) = 3^2 - 79 \cdot 3 + 1601 = 1373$ (prime)

...

- $f(79) = 79^2 - 79 \cdot 79 + 1601 = 1601$ (prime)
- $f(80) = 80^2 - 79 \cdot 80 + 1601 = 1681$ (not a prime)

$f(n) = n^2 - 79n + 1601$ is prime for $n=1, 2, \dots, 79$, but for $n=80, \dots$ it fails.

Thus, $n^2 - 79n + 1601$ is not prime for all positive integers n .