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Euler totient function

Definition.

$$\text{Euler}(n) := |\{1 \leq k \leq n | \gcd(k, n) = 1\}|$$

Thus

$$1 \leq \text{Euler}(n) \leq n - 1$$

- For a prime p ,

$$\{1 \leq k \leq n | \gcd(k, n) = 1\} = \{2, \dots, p - 1\}$$
$$\text{Euler}(p) = p - 1$$

- For a prime p and $k > 0$, we have

$$\gcd(k, p^k) = 1 \iff p \nmid k \iff k \notin p\mathbb{Z}$$

- The integers in $\{1, 2, \dots, p^k\}$ that are divisible by p

$$\{1, \dots, p^k\} \cap p\mathbb{Z} = \{p, 2p, 3p, \dots, (p^{k-1})p\}$$

- Thus

$$\text{Euler}(p^k) = p^k - p^{k-1} = p^k \left(1 - \frac{1}{p}\right)$$

Current note has 0 direct children and 0 total descendants.

- [stretchy.](#)
 - $\mathbb{Z}$
 - [Euler totient function](#)

And it has 6 siblings.

- [stretchy.](#)
 - $\mathbb{Z}$
 - [Division in \$\mathbb{Z}\$](#)
 - [Euler totient function](#)
 - [gcd of integers](#)
 - [Primes in \$\mathbb{N}\$](#)
 - [Partitions of naturals](#)
 - [Prime-representing function](#)