

Fill in primes.

$$\sigma(13) = 1 + 13 = 14$$

$$\sigma(7) = 1 + 7 = 8$$

$$\sigma(91) = \sigma(7 \cdot 13) = 112 = \sigma(7) \cdot \sigma(13) \\ = 8 \cdot 14$$

$$18 = 2 \cdot 3 \cdot 3 = 2 \cdot 3^2$$

$$\sigma(2) = 1 + 2 = 3$$

$$\sigma(9) = 1 + 3 + 9 = 13$$

$$\sigma(18) = 39$$

$$49 \rightarrow 7^2$$

$$\sigma(49) = 1 + 7 + 49$$

$$\sigma(n^2) = 1 + n + n^2$$

if  $n$  is odd, prime

$$\boxed{\sigma(2^n) = 2^{n+1} - 1} = 1 + 2 + 4 + \dots + 2^n$$

$$\sigma(16) = 31 = 2^5 - 1$$

$$\sigma(32) = 63 = 2^6 - 1$$

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$$\sigma(30) = 72 = 4 \cdot 18 = \sigma(3) \cdot \sigma(10)$$

$$\sigma(55) = 72 = 6 \cdot 12 = \sigma(5) \cdot \sigma(11)$$

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When is  $\sigma$  odd? prime?