

$$\begin{aligned}
 A &= \left( 1 + \frac{1}{2} + \frac{1}{4} + \frac{1}{8} + \dots \right) \rightarrow 2 \\
 &\cdot \left( 1 + \frac{1}{3} + \frac{1}{9} + \frac{1}{27} + \dots \right) \rightarrow \frac{3}{2} \\
 &\cdot \left( 1 + \frac{1}{5} + \frac{1}{25} + \frac{1}{125} + \dots \right) \rightarrow \frac{5}{4} \\
 &\cdot \left( 1 + \frac{1}{7} + \frac{1}{49} + \frac{1}{343} + \dots \right) \rightarrow \frac{7}{6} \\
 &\cdot \left( 1 + \frac{1}{p} + \frac{1}{p^2} + \frac{1}{p^3} + \dots \right) \rightarrow \frac{p}{p-1} \\
 &= \frac{2}{1} \cdot \frac{3}{2} \cdot \frac{5}{4} \cdot \frac{7}{6} \cdot \dots \cdot \frac{p}{p-1} \cdot \dots
 \end{aligned}$$

$n$	1	2	3	4	5	6	7	8	9	10	11	12
$R_2(n)$	1	0	-1	0	1	0	-1	0	1	0	-1	0
$S_2(n)$	1	1	0	1	2	0	0	1	1	2	0	0

$6^2 + 3^2 = 45$

If  $n$  is even,  $R_2(n) = 0$

If  $n$  is ~~two~~ 1 more than a multiple of 4,  $R_2(n) = 1$

... 1 less ... ,  $R_2(n) = -1$ .

$$S_2(45) = R_2(1) + R_2(3) + R_2(5) + R_2(9) + R_2(15) + R_2(45)$$

$1$ 
 $-1$ 
 $1$ 
 $1$ 
 $-1$ 
 $1$ 
 $= 2$

$S_2(45) = 4 \cdot 2 = 8$

$$S_2(n) = \left( \begin{array}{l} \# \text{ divisors that are 1 more than a mult. of 4} \\ - \# \text{ divisors that are 1 less than a multiple of 4} \end{array} \right)$$