$$\frac{\sin x}{x} = \left(1 - \frac{x^2}{\pi^2}\right)\left(1 - \frac{x^2}{4\pi^2}\right)\left(1 - \frac{x^2}{9\pi^2}\right)\cdots$$

$$\Longrightarrow -\frac{1}{6} = -\frac{1}{\pi^2} \times \sum_{n\geq 1} \frac{1}{n^2}$$

$$\zeta(2n) = 1 + 2^{-2n} + 3^{-2n} + 4^{-2n} + \cdots$$

$$\zeta(4) = \frac{\pi^4}{90}$$

$$\sum_{n\geq 1} \zeta(2n)x^{2n} = -\frac{\pi x}{2}\cot(\pi x)$$

$$\zeta(2) = \frac{\pi^2}{6}$$

$$= -\frac{x}{2} \times \sum_{j\geq 1} \frac{1}{x^2 - j^2}$$