A periodic voltage with period T_0 may be represented in terms of a Fourier series as:

$$V(t) = \frac{A_0}{2} + \sum_{n=1}^{\infty} A_n \cos(n\omega_0 t) + \sum_{n=1}^{\infty} B_n \sin(n\omega_0 t) \text{ where } \omega_0 = \frac{2\pi}{T_0}.$$

The Parseval theorem for Fourier series states that the average power released in a resistor is given by:

$$\overline{P} = \frac{1}{RT_0}\int_0^{T_0}\left[V(t)\right]^2 dt = \frac{1}{4R}\sum_{n=-\infty}^{\infty}\left(A_n^2 + B_n^2\right) \text{ where } A_{-n} = A_n \text{ and } B_{-n} = -B_n.$$

Prove the Parseval theorem.