

Question

By showing a detailed method, sum the following series.

$$\frac{\pi^2}{2^2 2!} - \frac{\pi^4}{2^4 4!} + \frac{\pi^6}{2^6 6!} - \frac{\pi^8}{2^8 8!} + \dots + \frac{(-1)^{n+1} \pi^{2n}}{2^{2n} (2n)!} + \dots$$