Result - Cesaro's theorem

If $\lim a_n = a$, $\lim b_n = b$

then

$$\lim_{n\to\infty} \frac{1}{n}\left[a_n b_1 + a_{n-1} b_2 + \dots a_1 b_n\right] = a \cdot b$$

Now in our Question

$$\lim_{n\to\infty} \frac{1}{n}\left[\left(\frac{1}{2}\right)^n + \left(\frac{1}{2}\right)\left(\frac{1}{2}\right)^{n-1} + \left(\frac{1}{3}\right)\left(\frac{1}{2}\right)^{n-2} + \dots \frac{1}{n}\left(\frac{1}{2}\right)\right]$$

here $a_n = \left(\frac{1}{2}\right)^n$ & $b_n = \frac{1}{n}$

$\lim_{n\to\infty} a_n = 0 = a$ & $\lim_{n\to\infty} b_n = 0 = b$

Thus

$$\lim_{n\to\infty} \frac{1}{n}\left[\left(\frac{1}{2}\right)^n + \dots\right] = a \cdot b = 0 \cdot 0 = \boxed{0}$$ A