Exercise: Establish the convergence of:

$$\sum_{n=1}^{\infty} (-1)^n \cdot \cos\left(\frac{1}{n}\right)$$

summation, from 1 to infinity of terms: minus 1 to the n-th power times cosine with 1 over n.

$a_n = \cos\left(\frac{1}{n}\right)$

I notice that it's an alternating series, so I will consider an to be only cosine with 1 over n.

$\lim_{n\to\infty} \left(\cos\left(\frac{1}{n}\right)\right) = ?$

Now I check the limit of an

$\lim_{n\to\infty} \left|\cos\left(\underbrace{\frac{1}{n}}_{\to 0}\right)\right| = \cos 0 = 1$

The limit of an is equal 1.

I know that if $\lim_{n\to\infty} a_n \neq 0$, then the series is divergent.

So, the series $\sum_{n=1}^{\infty} (-1)^n \cdot \cos\left(\frac{1}{n}\right)$ is DIVERGENT.

Aleksandra Lis EPM II