



Q: Sum of a divergent series  $\sum_{n=1}^{\infty} \frac{1}{n(2+n)}$  Calculate:  $\sum_{n=1}^{\infty} \frac{1}{n(2+n)}$ ,  $\sum_{n=1}^{\infty} \frac{1}{(2n+2n^2)}$   $\sum_{n=1}^{\infty} \frac{1}{n(2+n)}$  Calculations I did:  $\sum_{n=1}^{\infty} \frac{1}{n(2+n)} = \sum_{n=1}^{\infty} \frac{1}{(2n+2n^2)} = \frac{1}{2} \sum_{n=1}^{\infty} \frac{1}{n+n^2} = \frac{1}{2} \sum_{n=1}^{\infty} \frac{1}{n(n+1)} = \frac{1}{2} \sum_{n=1}^{\infty} \left( \frac{1}{n} - \frac{1}{n+1} \right) = \frac{1}{2} \left( \frac{1}{1} - \frac{1}{2} + \frac{1}{2} - \frac{1}{3} + \frac{1}{3} - \frac{1}{4} + \dots \right) = \frac{1}{2} \left( \frac{1}{1} \right) = \frac{1}{2}$ .  $\sum_{n=1}^{\infty} \frac{1}{n(2+n)}$  Is it right? If not how to do? A: First note that we can write  $\frac{1}{n(2+n)} = \frac{1}{2n} + \frac{1}{2n+2n^2}$  so that  $\sum_{n=1}^{\infty} \frac{1}{n(2+n)} = \sum_{n=1}^{\infty} \frac{1}{2n} + \sum_{n=1}^{\infty} \frac{1}{2n+2n^2} = \frac{1}{2} \sum_{n=1}^{\infty} \frac{1}{n} + \frac{1}{2} \sum_{n=1}^{\infty} \frac{1}{n(n+1)} = \frac{1}{2} \sum_{n=1}^{\infty} \frac{1}{n} + \frac{1}{2} \sum_{n=1}^{\infty} \left( \frac{1}{n} - \frac{1}{n+1} \right) = \frac{1}{2} \sum_{n=1}^{\infty} \frac{1}{n} + \frac{1}{2} \left( \frac{1}{1} - \frac{1}{2} + \frac{1}{2} - \frac{1}{3} + \frac{1}{3} - \frac{1}{4} + \dots \right) = \frac{1}{2} \sum_{n=1}^{\infty} \frac{1}{n} + \frac{1}{2} \left( \frac{1}{1} \right) = \frac{1}{2} \sum_{n=1}^{\infty} \frac{1}{n} + \frac{1}{2}$ .  $\sum_{n=1}^{\infty} \frac{1}{n(2+n)}$  Trouble logging in? If you can't remember your password or are having trouble logging in, you will have to reset your password. If you have trouble resetting your password (for example, if you lost access to the original email address), please do not start posting with a new account, as this is against the forum rules. If you create a temporary

