I.3 Partial Sums

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1 Conclusions

- $s_n = \sum_{i=1}^{n} \frac{\ln(i^4+i+3)}{\sqrt{i}+3}$

I created 15 partial sum terms for this summation, they are as follows:
term 1 : 0.40235947810852507
term 2 : 0.6897089129703725
term 3 : 0.9437574320866124
term 4 : 1.114430806435553
term 5 : 1.2319302289165963
term 6 : 1.3164458799573575
term 7 : 1.379408416895477
term 8 : 1.4275632063116666
term 9 : 1.4651209380439294
term 10 : 1.494843308870977
term 11 : 1.51861748505174
term 12 : 1.5377774529395076
term 13 : 1.553293139298827
term 14 : 1.5658867158148757
term 15 : 1.57610687398901

I am concluding that this sequence will diverge. I came to this conclusion because each of the terms are gradually increasing, and by experimenting with variable manipulation within the program. I replaced 15 with 1500 and received a much greater sum value which was greater than 1400, I could have used an even greater number perhaps in the hundreds of thousands, but I figured that this provided me sufficient evidence that the sum will diverge.

- $t_n = \sum_{i=1}^{n} \frac{e^{i/100}}{i^{10}}$

For this summation I created 15 partial sum terms, they are as follows:
term 1 : 1.010050167084168
term 2 : 0.0009962903711198787
term 3 : 1.7450838015097918e-05
term 4 : 9.925945035861857e-07
term 5 : 1.0765016026890488e-07
term 6 : 1.7560835111275428e-08
term 7 : 3.7968217925324015e-09
term 8 : 1.0088897009146946e-09
term 9 : 3.138061198711926e-10
term 10 : 1.1051709180756477e-10
term 11 : 4.303735192027638e-11
term 12 : 1.8209703622079293e-11
term 13 : 8.260850442002587e-12
term 14 : 3.9766820656790045e-12
term 15 : 2.0147983277511253e-12

Based on these values becoming increasing smaller and smaller I first thought that this sum would converge around a very small value, but seeing as there is no fluctuation of the terms, that is not the case. For a number of various values that I plugged into this summation, the resulting sum was around 1.011eSOMETHING. This experimentation led me to further believe that the equation would converge, but upon further testing and plugging in values in the hundreds of thousands, I saw that the sum increases, hence I concluded that this series converges.