Problem I.3 - Partial Sums

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Math 361B

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

a) $.402, 1.092, 2.036, 3.150, 4.382, 5.699, 7.078, 8.506, 9.970, 11.466,$
$12.984, 14.522, 16.075, 17.641, 19.217, ..., 5355.997, 5356.355, 5356.713, 5357.071, 5357.429,$
$5357.786, 5358.144, 5358.502, 5358.860, 5359.217, 5359.575, 5359.933, 5360.291, 5360.648$

b) I think this series will diverge because if I increase N more and more, the terms keep increasing and do not peak at a certain point.

d) I started off at 100 terms, but I ended up at 10,000 terms, because I figured that was enough to show if the series is converging or diverging.

2. $t_n = \sum_{i=1}^{n} \frac{e^{\frac{1}{100}}}{i^{10}}$

a) $1.010, 1.011, 1.011, 1.011, 1.011, 1.011, 1.011, 1.011, 1.011, 1.011, 1.011, 1.011, 1.011, 1.011,$
$1.011, ..., 262516.871, 264886.778, 267278.107, 269691.053, 272125.810, 274582.576, 277061.551,$
$279562.935, 282086.931, 284633.744, 287203.581, 289796.649, 292413.159, 295053.324, 297717.356$

b) I think this series converges since the first 15 terms are all around 1.011, and the last 15 terms are drastically changing from around 260,000 to 300,000.

c) I think it converges to 1.011.

d) I once again used 10,000 terms since it wasn't clear if the series converged with just 100 terms.

3. $r_n = \sum_{i=1}^{n} \frac{ln(i^2)}{\sqrt{i}+1}$

a) $0.0, 0.800, 1.899, 3.139, 4.453, 5.807, 7.183, 8.570, 9.960, 11.348, 12.732, 14.111, 15.482,$
$16.845, 18.199, ..., 2885.839, 2886.023, 2886.207, 2886.392, 2886.576, 2886.760, 2886.945,$
$2887.129, 2887.313, 2887.497, 2887.682, 2887.866, 2888.050, 2888.234, 2888.418$

b) I think this series diverges since the beginning terms are increasing steadily, and the last terms are still increasing, even when I increase N.

d) I used 10,000 terms to come to my conclusion. When I increased the terms to 19,000, the last 15 terms were still increasing.