1). What are the first 4 terms of the sequence of partial sums of $\sum_{n=1}^{\infty} n!$ (2 points)

$$\sum_{n=1}^{\infty} n! = 1! + 2! + 3! + \cdots$$

$$S_{1} = 1! = 1$$

$$S_{2} = 1! + 2! = 3$$

$$S_{3} = 1! + 2! + 3! = 9$$

$$S_{4} = 1! + 2! + 3! + 4! = 33$$

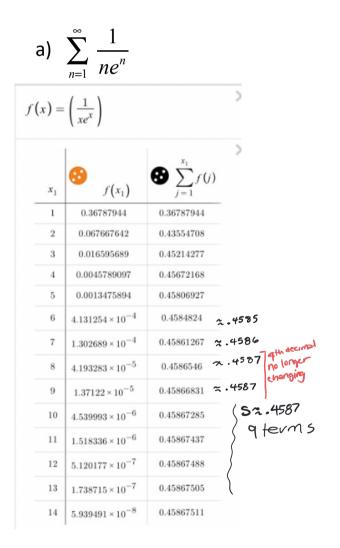
Sequence of Partial sums

2) For the following convergent series,

(6 points)

- a) Use Desmos to generate a list of the first 10 partial sums. (Attach a screen shot of the results).
- b) Estimate the sum, correct to 4 decimal places
- c) How many terms of the sequence of partial sums did your group need in order to make an estimate?

https://www.desmos.com/calculator/bm5ygqipv5



$(x) = \frac{(-1)^{(x-1)}}{(x)^3}$				8			
	(4)			35	2.332362 × 10 ⁻³	0.90155384	
		χ.		36	-2.143347×10^{-5}	0.90153241	4 ~ auto
x_1	$f(x_1)$	$ \sum_{j=1}^{n} f(j) $)	37	1.974217 × 10 ⁻⁵	0.90155215	Still changing. Need more terms Steys & 9015 Took 41 term Converges more slowly them
1	1	1		38	-1.822423×10^{-5}	0.90153392	
2	-0.125	0.875		39	1.685801×10^{-5}	0.90155078	
3	0.037037037	0.91203704		40	-1.5625×10^{-5}	0.90153516	
4	-0.015625	0.89641204		41	1.450937 × 10 ⁻⁵	0.90154967	
5	0.008	0.90441204		42	-1.349746 × 10 ⁻⁵	0.90153617	
6	-0.0046296296	0.89978241					
7	0.0029154519	0.90269786		43	1.257751 × 10 ⁻⁵	0.90154875	
8	-0.001953125	0.90074473		44	-1.173929×10^{-5}	0.90153701	
9	0.0013717421	0.90211648		45	1.097394×10 ⁻⁵	0.90154798	
10	-0.001	0.90111648		46	-1.027369×10^{-5}	0.90153771	
11	7.513148×10^{-4}	0.90186779					
12	-5.787037×10^{-4}	0.90128909		47	9.631777 × 10 ⁻⁶	0.90154734	
13	4.551661 × 10 ⁻⁴	0.90174425	≈ .901	48	-9.042245×10^{-6}	0.9015383	
14	-3.644315×10^{-4}	0.90137982	.901	8.49986 × 10	8.49986×10^{-6}	0.9015468	
8	4th dear	12					
0	Place still		2				

3) For each of the following,

(12 points)

- a) Does the series converge? Why/Why not?
- b) If so, what is the exact sum?

a)
$$\sum_{n=1}^{\infty} \frac{n^2 - 3n}{6n^2 - 5n + 9}$$
 $\lim_{n \to \infty} Q_n = \lim_{n \to \infty} \frac{n^2 - 3n}{6n^2 - 5n + 9} = \frac{1}{6}$

Since $\lim_{n\to\infty} C_n \neq 0$, the serves $\sum_{n=1}^{\infty} \frac{n^2-3n}{6n^2-5n+9}$ diverges by the Test for Divergency

b)
$$\sum_{n=1}^{\infty} \frac{4^{n-1}}{5^n} = \sum_{n=1}^{\infty} \int_{5}^{\infty} (4)^{n-1}$$
 geometric with $9=5$, $r=4$

Since
$$|r| = 4 \le 1$$
, $\sum_{n=1}^{\infty} \frac{4^{n-1}}{5^n}$ converges and the sum = $5 = \frac{4}{1-r} = \frac{1}{1-1/5} = \frac{1}{1-1/5}$

c)
$$\sum_{n=1}^{\infty} \frac{2}{n(n+2)}$$

$$= \sum_{n=1}^{\infty} \left(\frac{1}{n} - \frac{1}{n+2}\right)$$

$$| using partial fractions, | \frac{2}{n(n+2)} = \frac{1}{n} - \frac{1}{n+2}$$

So the nth partial sum is

Anything subtected gets added 2 terms would cence

Telescoping Series on collapses series converges

Sn=H= IIII IIII Sn= 3 5= 3/2

Note: should show both of these in Sh