Assignment #11
Series of Power II: Taylor's Formula *vs.* Algebra
Due* just before midnight on Friday, 5 April.

Please do all three of the following problems by hand. No SageMath this time, except maybe to check your answers.

1. For what values of x does the series $\sum_{n=0}^{\infty}(-1)^n(n+1)x^n$ converge? *[3]*

2. Use Taylor's Formula to show that $\dfrac{1}{(1+x)^2} = \sum_{n=0}^{\infty}(-1)^n(n+1)x^n$ when the series converges. *[4]*

3. Use algebra to show that $\dfrac{1}{(1+x)^2} = \sum_{n=0}^{\infty}(-1)^n(n+1)x^n$ when the series converges. *[3]*

Hint: $\dfrac{1}{1+x} = \dfrac{1}{1-(-x)}$ is the sum of the geometric series $\sum_{n=0}^{\infty}(-1)^n x^n = 1 - x + x^2 - x^3 + \cdots$ when that series converges.

Another mathematics nursery rhyme:

> Little Jack Horner
> Sat in the corner
> trying to work out π.
> He said 'It's minus the logarithm
> Of minus one to the i.'

Also from *Seven Years of Manifold 1968-1980*.