Questions for recitation 9 April 2021

1. Consider the power series below. For what values of x does the series converge absolutely? Conditionally? What is the interval of convergence?

$$\sum_{n=1}^{\infty} \frac{(-1)^n (x-4)^n}{n 2^n}$$

2. Consider $g(x) = \ln(1+x)$.

   (a) Using $\frac{1}{1+t} = \sum_{n=0}^{\infty} (-t)^n$ for $|t| < 1$, find a series for $g(x)$ and the associated radius of convergence.

   (b) Suppose we wish to evaluate $\int_0^1 x g(x)\, dx$ via series. How many terms of the associated series would we need to use to ensure that our result is within .01 of the correct value?

3. Noting that the geometric series satisfies $\sum_{n=0}^{\infty} x^n = \frac{1}{1-x}$ for $|x| < 1$, determine power series expansions for the following functions. Also determine the relevant radii of convergence.

   (a) $\dfrac{1}{1+x^2}$

   (b) $\dfrac{1}{x+2}$

   (c) $\dfrac{x^3}{x+2}$