

1. Find the interval of convergence of each of the following power series:

i)  $\sum_{n=1}^{\infty} \frac{(-2x)^n}{n^{\frac{3}{2}}}$ .

ii)  $\sum_{n=1}^{\infty} \frac{3^n(x-2)^n}{n+1}$ .

iii)  $\sum_{n=1}^{\infty} \frac{(1-3x)^n}{n}$ .

2. By integrating from  $t = 0$  to  $t = x$  the power series  $\frac{1}{1+t} = \sum_{n=0}^{\infty} (-1)^n t^n$ ,  $|t| < 1$ , show that

$$\ln(1+x) = \sum_{n=1}^{\infty} \frac{(-1)^{n+1} x^n}{n}$$

for all  $|x| < 1$ .

3. Use series to estimate the integral' value

$$\int_0^{0.1} \frac{1}{\sqrt{1+x^4}} dx$$

with an error of magnitude less than  $10^{-8}$ .

4. Let  $f(x) = \sqrt[5]{1+x^3}$ . Find  $f^{(30)}(0)$ .