

1. Consider the following two series $\sum_1^{\infty} \frac{1}{n^4}$ $\sum_1^{\infty} \frac{(-1)^n}{n^4}$
- What is the error in each series if the first 5 terms are added?
 - What is the error in each series if the first 10 terms are added?
 - What is the error in each series if the first 20 terms are added?
 - How many terms do you need to compute so that your error $< 10^{-12}$?
 - How many terms do you need to compute so that your error $< 10^{-15}$?

2. Find the radius of convergence and interval of convergence for

- $\sum_1^{\infty} n(x+3)^n$
- $\sum_1^{\infty} \frac{(x-4)^n}{n^2}$
- $\sum_1^{\infty} \frac{(2x-3)^{2n}}{n}$
- $\sum_1^{\infty} \frac{4x-5)^n}{n!}$

3. Find the power series for

- $\frac{1}{1+2x}$
- $\frac{1}{3-4x}$
- $\frac{1}{9+x^2}$

4. Find the Maclaurin series for

- $x \sin x^2$
- $\frac{e^{-x} - 1 + x}{x}$
- $\frac{\cos x^2 - 1}{x^2}$

5. Let $f(x) = e^{-x^2}$.

- Write its Maclaurin series.
- Evaluate $\int_0^1 e^{-x^2} dx$.
- What is the error if the first 4 terms are taken?
- Evaluate $\int_0^{1/2} e^{-x^2} dx$.
- What is the error if the first 4 terms are taken?

6. Let $f(x) = \cos x^2$.

a) Write its Maclaurin series.

b) Evaluate $\int_0^1 \cos x^2 dx$.

c) How many terms do you need if your error $< 10^{-4}$?

d) Evaluate $\int_0^{1/2} \cos x^2 dx$.

e) How many terms do you need if your error $< 10^{-4}$?

7. Find the first 6 nonzero terms of the Taylor series if

a) $f(x) = \tan^{-1} x^2$ about $x_0 = 0$.

b) $f(x) = \frac{3}{4-2x}$ about $x_0 = 1$.