

**2021-22 First Semester  
MATH1083 Calculus II (1002)**

Assignment 3

Due Date: 11:30am 8/Mar/2021(Wed).

- Write down your **Chinese name** and **student number**. Write neatly on **A4-sized** paper and **show your steps**.
- **Late submissions or answers without details will not be graded.**

1. Find the radius of convergence and interval of convergence of the power series

(a)

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

(b)

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

(c)

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

2. a power series representaion for the function and determine the interval of convergence

$$\frac{1}{(1+x)^3}$$

[Hint: You will need to find the power series for  $1/(1+x)^2$  first]

3. Find the **Taylor series** fo  $f(x)$  centered at the given value of  $a$ , and find the associated **radius of convergence**.

(a)  $f(x) = e^{2x}$ ,  $a = 3$

(b)  $f(x) = 1/x^2$ ,  $a = 1$

4. Use **binomial series** to expand the given function as a power series and find the **radius of convergence**

$$(2-x)^{3/4}$$

5. Approximate function  $f(x)$  by a Taylor's polynomial with degree  $n$  at center  $a$ , and use Taylor's Inequality to **estimate the accuracy** of the approximation when  $f(x) \approx T_n(x)$  when  $x$  lies in the given interval.

(a)  $f(x) = 1/x$ ,  $a = 1$ ,  $n = 2$ ,  $0.7 \leq x \leq 1.3$

(b)  $f(x) = x \ln x$ ,  $a = 1$ ,  $n = 3$ ,  $0.5 \leq x \leq 1.5$