**Mathematics Methods Unit 3 & 4 Investigation 2 2022**

**Take Home Section**

Student name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Teacher name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Task type: Investigation**

**Take Home out: Friday Week 8, Term 2, 2022**

**In class Validation: in usual maths rooms 7:40am**

**Time allowed for in class task: \_\_\_\_40\_\_\_\_\_\_\_ mins**

**Materials required:** Formula Sheet; Calculators and/or Classpads

Standard items: Pens (blue/black preferred), pencils (including coloured), sharpener, correction fluid/tape, eraser, ruler, highlighters

Special items: Drawing instruments, NO NOTES

**Task weighting: \_10\_\_\_% in class only**

**Formula sheet provided: Yes**

**Note: All part questions worth more than 2 marks require working to obtain full marks.**

**INTRODUCTION**

The sum of an infinite number of polynomial terms can represent a non-polynomial function. Even through a sum cannot be calculated, an approximation of the function can be obtained by using a finite number of terms. The more terms used, the better the approximation.

**TASK:**

Investigate the function and the nature of the curve formed by the sum of a finite number of terms of sequences $f(x)$ and $g(x)$ shown below.

$f\left(x\right)=x-\frac{x^{3}}{3!}+\frac{x^{5}}{5!}-\frac{x^{7}}{7!}+…$ $g\left(x\right)=1-\frac{x^{2}}{2!}+\frac{x^{4}}{4!}-\frac{x^{6}}{6!}+…$

Examine $f^{'}\left(x\right)$ and $g'(x)$ and any relationship that exists between all functions and graphs considered.