Math 146 - Calculus II Name________________________

PowerPoints

1. Consider the function defined by

$$f(x) = \sum_{k=0}^{\infty} x^k = 1 + x + x^2 + x^3 + \dots$$

Since this infinite series involves powers of x, we call it a **power series**.

(a) Evaluate $f(0)$.

(b) Evaluate $f\left(\frac{1}{2}\right)$.

(c) Explain why $f(2)$ does not exist. That tells us that 2 is not in the domain of f.

(d) For what values of x does $f(x)$ exist, in the sense that the series converges at those values of x?

(e) Write your answer to (d) in interval notation. This interval is the domain of the function f and is called the **interval of convergence of the power series.**

(f) Find an explicit formula for $f(x)$ that works for all values of x in the interval of convergence. Hint: geometric

2. Consider the function defined by

$$g(x) = \sum_{k=0}^{\infty} \frac{x^k}{k+1} = 1 + \frac{x}{2} + \frac{x^2}{3} + \frac{x^3}{4} + \frac{x^4}{5} + \ldots$$

(a) Evaluate $g(0)$.

(b) Explain why $g(1)$ does not exist. Hint: what famous series do you get?

(c) Remind me how we know $g(-1)$ exists. Hint: it's another famous series.

(d) For what values of x does $g(x)$ exist, in the sense that the series converges at those values of x? Hint: use the Ratio Test to find the interval of convergence. Write your answer in interval notation.