

MATH 1901 - Differential Calculus

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Tutor = Daniel Daners

Name = Keegan Gyoery
SID = 470413467

Assignment 1

Question 1

(a) Consider the equation

$$x^{n+1} - (n+1)x + n = (x-1)[1 + x + x^2 + \dots + x^n - (n+1)]$$

We are required to prove this result for the conditions:

$$x \geq 1, x \in \mathbb{R}, n \in \mathbb{N}$$

$$RHS = (x-1)[1 + x + x^2 + \dots + x^n - (n+1)]$$

It can be seen that $1 + x + x^2 + \dots + x^n$ is a GP, with first term = 1, ratio = x , and $(n+1)$ terms

$$\therefore 1 + x + x^2 + \dots + x^n = \frac{(x^{n+1}-1)}{x-1}$$