Practice for the 2024 MAT136 Exam – SOLUTIONS

`Last Updated: Thursday April 4`

Questions on Material from Weeks 9-11

1. A power series is any infinite series that looks like this:

$$c_0 + c_1(x-a) + c_2(x-a)^2 + c_3(x-a)^3 + \ldots = \sum_{n=0}^{\infty} c_n(x-a)^n$$

Based on this definition, is the Taylor Series for $\dfrac{1}{1-2x}$ centred at $x = 0$ a power series? Find the Taylor series and see if you can find a definition for the n^{th} coefficient c_n.

Sample Solution: In general, all Taylor Series are Power Series where $c_n = \dfrac{f^{(n)}(a)}{n!}$. For this particular function $f(x) = \frac{1}{1-2x} = (1-2x)^{-1}$,

$f'(x) = -(1-2x)^{-2}(-2)$,