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MATH- III Tutorial - 3

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1 Find the radius of convergence of the following series

$(a)\ 1 + x + x^2 + x^3 + \cdots$

$(b)\ 1 - \dfrac{x^2}{2^2} + \dfrac{x^4}{2^2 4^2} + \dfrac{x^6}{2^2 4^2 6^2} + \cdots$

$(c)\ \displaystyle\sum_{n=1}^{\infty} \frac{p(p-1)(p-2)\cdots(p-n+1)}{n!} x^n$, where $p > 0$

2 Using the method of power series to find the series expansion of $\sin^{-1} x$.

3 Find the general solution of the following differential equations in terms of power series in x

$(a)\ y'' - 2xy' + 2py = 0$, where $p > 0$

$(b)\ (1 - x^2)y'' + 2xy' - 2y = 0$

$(c)\ (1 + x^2)y'' + 2xy\prime - 2y = 0$

$(d)\ y'' + xy' + y = 0$