Discrete Assignment

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1) **Question 11.9.4.9**: Find the sum to n terms of the series whose nth term is given by $n^2 + 2^n$?
Solution:

TABLE I
INPUT PARAMETERS

Variable	Description	Value
$x(n-1)$	n-th term of sequence	$(n^2+2^n)u(n)$

$$x(n-1) = (n^2 + 2^n)u(n) \tag{1}$$

$$2^n \cdot u(n) \overset{\text{Z}}{\longleftrightarrow} \frac{1}{1-2z^{-1}} \tag{2}$$

$$\tag{3}$$

Refer equation(**??**),equation(**??**) from appendix and equation(2)

$$z^{-1}X(z) = \frac{z^{-1}(z^{-1}+1)}{(1-z^{-1})^3} + \frac{1}{1-2z^{-1}} \tag{4}$$

$$X(z) = \frac{z^{-1}+1}{(1-z^{-1})^3} + \frac{1}{z^{-1}(1-2z^{-1})}, \quad |z| > 2 \tag{5}$$

$$Y(z) = X(z)U(z) \tag{6}$$

$$z^{-1}Y(z) = \left(\frac{z^{-1}(z^{-1}+1)}{(1-z^{-1})^3} + \frac{1}{1-2z^{-1}}\right)\left(\frac{1}{1-z^{-1}}\right) \tag{7}$$

$$z^{-1}Y(z) = \frac{z^{-1}(1+z^{-1}}{(1-z^{-1})^4} + \frac{2}{1-2z^{-1}} - \frac{2}{1-z^{-1}}, \quad |z| > 2 \tag{8}$$

$$\frac{z^{-1}(1+z^{-1})}{(1-z^{-1})^4} \overset{z^{-1}}{\longleftrightarrow} \frac{n(n+1)(n+2)}{6}u(n) \tag{9}$$

$$\frac{1}{1-2z^{-1}} \overset{z^{-1}}{\longleftrightarrow} 2^n u(n) \tag{10}$$

$$y(n-1) = \frac{n(n+1)(2n+1)}{6}u(n) + 2.2^n u(n) - 2u(n) \tag{11}$$

$$y(n) = \left(\frac{(n+1)(n+2)(2n+3)}{6} + 2^{n+2} - 2\right)u(n) \tag{12}$$

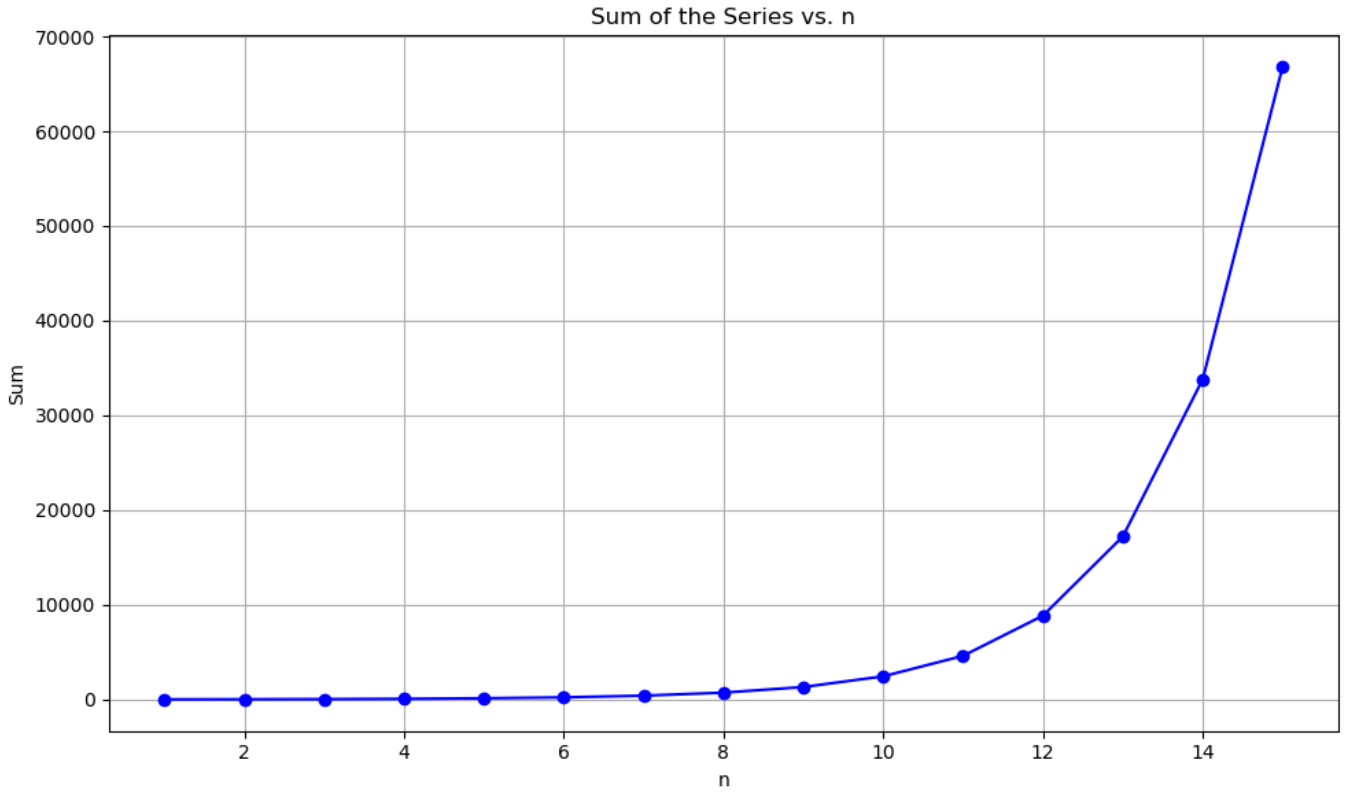

Fig. 1. Graph of $y(n)$ for $n \leq 15$ (Graph beyond $n = 29$ is not shown)