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 $5 - 2n$?
Solution:

TABLE 1
INPUT PARAMETERS

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

$$S = \sum_{n=0}^{N} (n^2 + 2^n)u(n)$$

Let $y(n)$ denote the nth term of the series without the unit step function:

$$y(n) = n^2 + 2^n$$

a) Sum of n^2:

$$S_{n^2} = \sum_{n=0}^{N} n^2 u(n) = \frac{N(N+1)(2N+1)}{6}$$

b) Sum of 2^n:

$$S_{2^n} = \sum_{n=0}^{N} 2^n u(n) = 2(2^N - 1)$$

Therefore, the sum to N terms of the series $n^2 + 2^n$ is:

$$S = S_{n^2} + S_{2^n} = \frac{N(N+1)(2N+1)}{6} + 2(2^N - 1)$$

This formula gives the sum of the series up to N terms.