

# Discrete Assignment

## EE1205 Signals and Systems

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### Question

If the sum of the first  $n$  terms of an AP is  $4n - n^2$ , what is the first term ( $S_1$ )? What is the sum of the first two terms? What is the second term? Similarly, find the 3rd, the 10th, and the  $n$ th terms.

### Solution:

variable	value	description
y(n)	$(4n - n^2)u(n)$	Sum of first n-terms
x(n)	-	$n^{\text{th}}$ term of the AP
d	-	common difference of AP

TABLE I

TABLE: INPUT PARAMETERS

$$y(n-1) = (4n - n^2)u(n) \quad (1)$$

refer equation(??) ,equation (??),equation (??) from appendix

$$z^{-1}Y(z) = 4\left(\frac{z^{-1}}{(1-z^{-1})^2}\right) - \frac{z^{-1}(1+z^{-1})}{(1-z^{-1})^3} \quad (2)$$

$$Y(z) = \frac{4}{(1-z^{-1})^2} - \frac{(1+z^{-1})}{(1-z^{-1})^3}, \quad |z| > 1 \quad (3)$$

$$Y(z) = X(z)U(z) \quad (4)$$

$$X(z) = \frac{Y(z)}{U(z)} \quad (5)$$

$$X(z) = 4\left(\frac{1}{(1-z^{-1})}\right) - \frac{(1+z^{-1})}{(1-z^{-1})^2} \quad (6)$$

$$= \frac{(3-5z^{-1})}{(1-z^{-1})^2} \quad (7)$$

$$= \frac{3}{1-z^{-1}} - \frac{2z^{-1}}{(1-z^{-1})^2} \quad (8)$$

refer equation(??) from appendix

$$x(n) = 3u(n) - 2nu(n) \quad (9)$$

$$x(n) = (3 - 2n)u(n) \quad (10)$$

$$\text{First term of AP } x(0) = 3 \quad (11)$$

$$\text{sum of first two terms is } y(1) = 4(2) - (2)^2 \quad (12)$$

$$= 4 \quad (13)$$

$$\text{second term of AP } x(1) = 1 \quad (14)$$

$$\text{third term of AP } x(2) = -1 \quad (15)$$

$$\text{tenth term of AP } x(9) = -15 \quad (16)$$

$$n^{\text{th}} \text{ term of AP } x(n) = (3 - 2n)u(n) \quad (17)$$

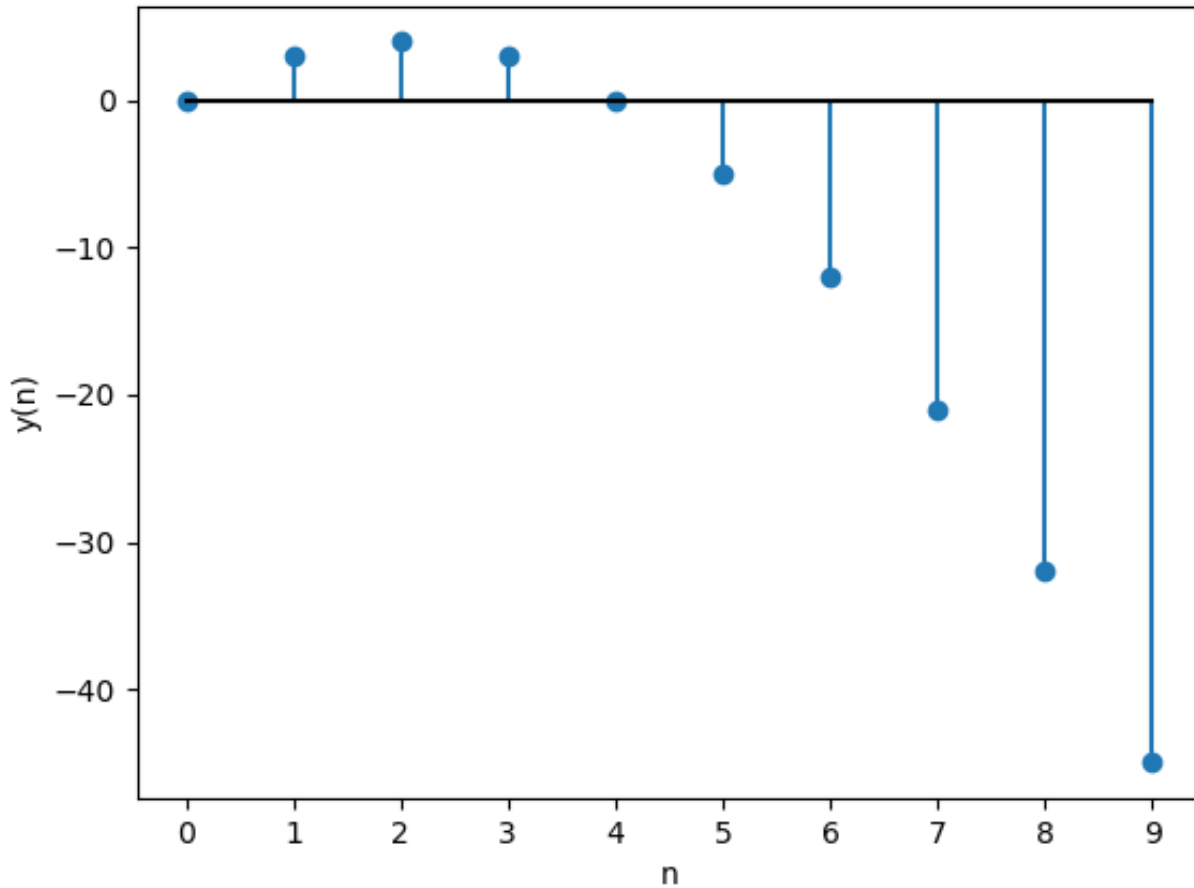


Fig. 1. stem plot of y(n)