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Discrete Assignment NCRET - 10.5.3.11

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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 nth terms. **Solution:**

variable	value	description
y(n)	$(4n - n^2)u(n)$	Sum of first n-terms
x(n)	-	<i>n</i> th term of the AP
d	-	common difference of AP

TABLE I

TABLE: INPUT PARAMETERS

$$y(n-1) = \left(4n - n^2\right)u(n) \tag{1}$$

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

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

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

$$Y(z) = X(z) U(z) \tag{4}$$

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

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

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

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

refer equation(??) from appendix

$$x(n) = 3u(n) - 2nu(n) \tag{9}$$

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

$$x(0) = 3 \tag{11}$$

$$y(1) = 4(2) - (2)^2 (12)$$

$$=4\tag{13}$$

$$x(1) = 1 \tag{14}$$

$$x(2) = -1 \tag{15}$$

$$x(9) = -15 (16)$$

$$x(n) = (3 - 2n)u(n) (17)$$

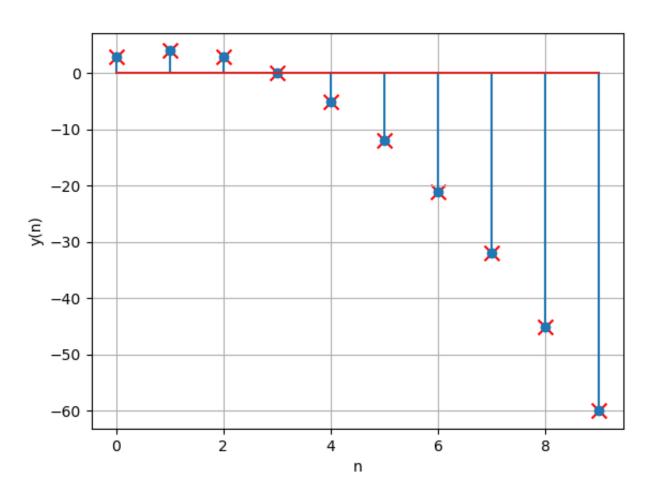


Fig. 1. stem plot of y(n)