

Discrete Assignment

Karyampudi Meghana Sai
EE23BTECH11031

Write the first five terms of the sequence $a_n = \frac{n(n^2+5)}{4}$.

Solution:

$$x(n) = \left(\frac{(n+1)^3 + 5(n+1)}{4} \right) u(n) \quad (1)$$

$$n^k u(n) \xleftrightarrow{ZT} (-1)^k z^k \frac{d^k}{dz^k} U(z) \quad (2)$$

$$nu(n) \xrightarrow{Z} \frac{z^{-1}}{(1-z^{-1})^2} \quad |z| > 1 \quad (3)$$

$$n^2 u(n) \xrightarrow{Z} \frac{(z^{-1})(1+z^{-1})}{(1-z^{-1})^3} \quad |z| > 1 \quad (4)$$

$$n^3 u(n) \xrightarrow{Z} \frac{(z^{-1})(1+4z^{-1}+z^{-2})}{(1-z^{-1})^4} \quad |z| > 1 \quad (5)$$

Referencing the equations from (3), (4), and (5).

$$\mathcal{X}(z) = \frac{(z^{-1})(1+4z^{-1}+z^{-2})}{4(1-z^{-1})^4} + \frac{3(z^{-1})(1+z^{-1})}{4(1-z^{-1})^3} + \frac{2z^{-1}}{(1-z^{-1})^2} + \frac{3}{2(1-z^{-1})} \quad (6)$$

$$\mathcal{X}(z) = \frac{3}{2(1-z^{-1})^3} + \frac{3z^{-2}}{2(1-z^{-1})^4} \quad (7)$$

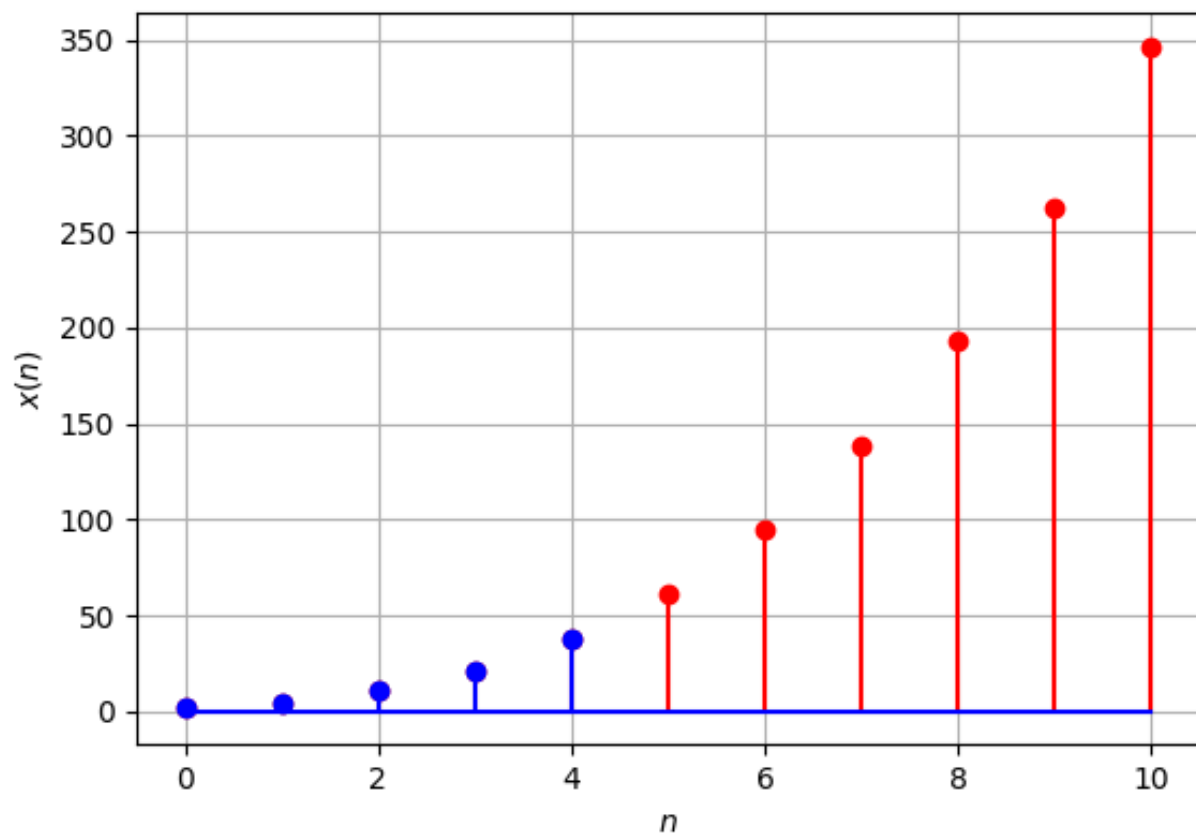


Fig. 0. Plot of equation(1)