

# Discrete Assignment

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EE23BTECH11031

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

**Solution:**

$$x(n) = \left( \frac{n^3 + 3n^2 + 8n + 6}{4} \right) u(n) \quad (1)$$

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

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

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

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

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

$$x(n) \xrightarrow{Z} \frac{(z^{-1})(1 + 4z^{-1} + z^{-2})}{4(1 - z^{-1})^4} + \frac{3(z^{-1})(1 + z^{-1})}{4(1 - z^{-1})^3} + \frac{2z^{-1}}{(1 - z^{-1})^2} + \frac{3}{2(1 - z^{-1})} \quad |z| > 1 \quad (6)$$

$$x(n) \xrightarrow{Z} \frac{3}{2(1 - z^{-1})^3} + \frac{3z^{-2}}{2(1 - z^{-1})^4} \quad |z| > 1 \quad (7)$$

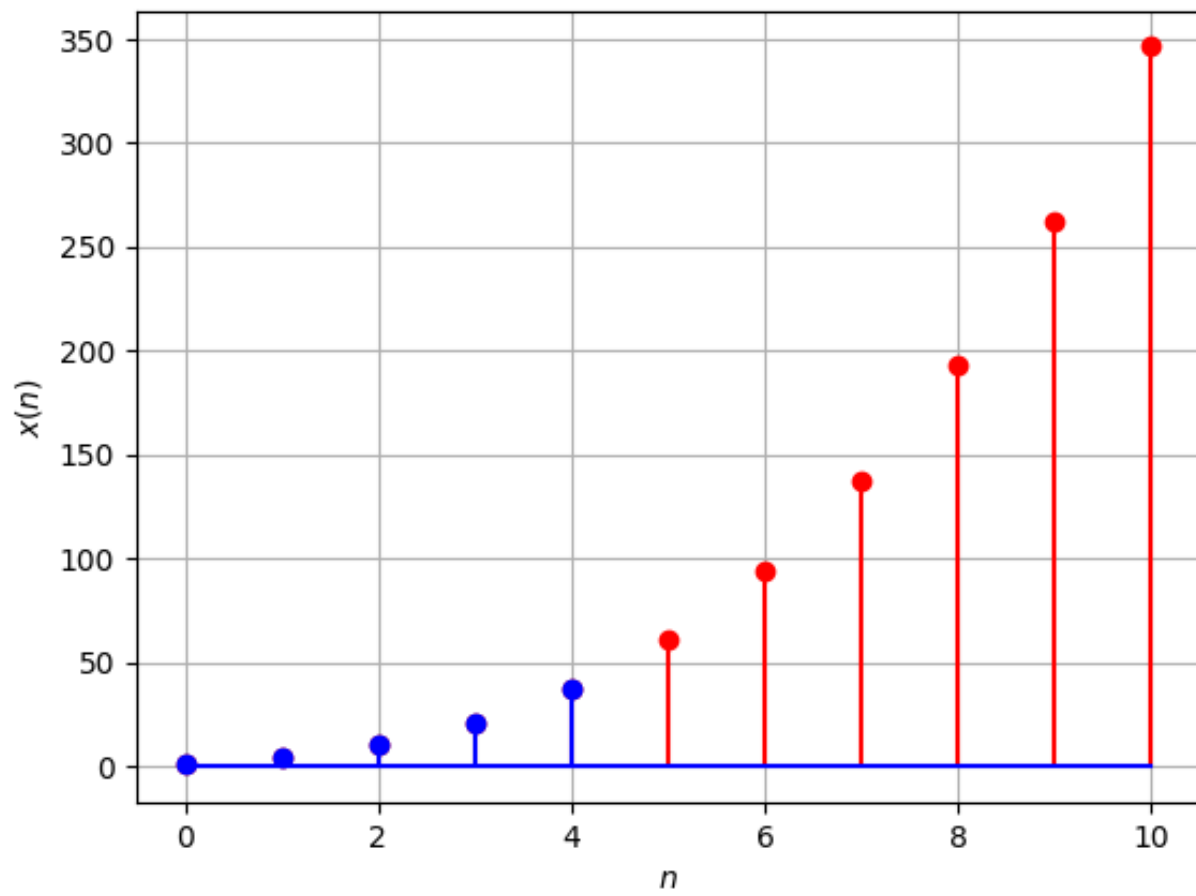


Fig. 0. Plot of equation(1)