W={0,1,2,3,---} Saturday, September 25, 2021 9:57 AM -Glenerating function Let fant be a sequence of real no's then the generating function is denoted by G(9,2) and it is given by  $G(q,z) = \sum_{n=0}^{\infty} a_n z^n$  $G_1(a_1z) = a_0 z^0 + a_1 z^1 + a_2 z^2 + a_3 z^3 + - - - - \infty$ G(a/z) = a0 + a1 z + a2 z + a3 z + --- 00  $G(9/7) - a_0 = (a_1 z + a_2 z^2 + a_3 z^3 + - - - - \infty)$  $G_1(a_1z) - a_0 - a_1z = (a_2z^2 + a_3z^3 + - - - \infty)$ If am= b +new {b, b, b, ----} What is the generating function for an.  $Soln: G(a,z) = \sum_{n=0}^{\infty} a_n z^n$ =  $\sum_{n=1}^{\infty} p z^{n}$ .  $= b \left[ \sum_{n=0}^{\infty} z^n \right]$  $\begin{array}{c}
\left(a_{n}=b\right) & \forall n \in \mathbb{W} \\
\left(a_{1},z\right) = b \\
1-z
\end{array}$  $=b\left[z^{0}+z^{1}+z^{2}+\cdots\infty\right]$  $= b \left[ 1 + 7 + 7^2 + - - \infty \right]$ 7 G1 (4,2) = 2003  $= b(1-z)^{-1} = \frac{b}{1-z}$  $\begin{cases} a_0, a_1, a_2, a_3, --- \end{cases}$ 1 1 b, b 2 b 3 ==--Grant by then fine an = bn + new find the generating function

Solution
$$S_{1}^{2} = \sum_{n=0}^{\infty} q_{n} z^{n}$$

$$= \sum_{n=0}^{\infty} b^{n} z^{n}$$

$$= \sum_{n=0}^{\infty} (bz)^{n}$$

$$= (bz)^{0} + (bz) + (bz)^{2} + - - \infty$$

$$= (1-bz)^{-1}$$

$$S_{1}^{2} = \frac{1}{1-bz}$$

$$a_{n} = \begin{bmatrix} b \\ b \end{bmatrix} \quad \forall n \in \mathbb{N}$$

$$G(a,z) = \frac{1}{1-bz}$$

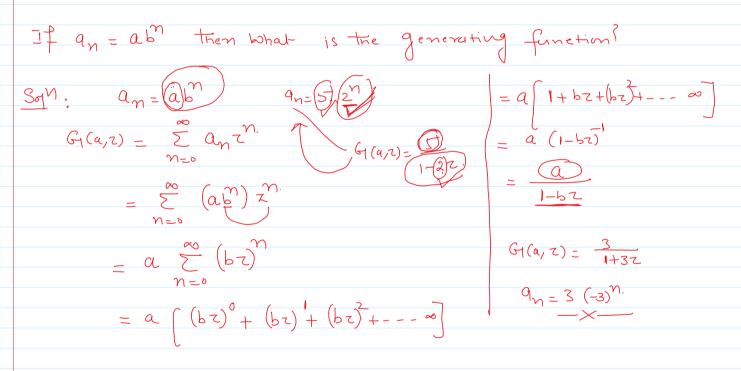
$$A_{n} = \begin{bmatrix} 3 \\ 3 \end{bmatrix}^{n} \quad \forall n \in \mathbb{N}$$

$$G(a,z) = \frac{1}{1-3z}$$

$$A_{n} = \begin{bmatrix} -3 \\ 1 \end{bmatrix}^{n}$$

$$G(a,z) = \frac{1}{1-(-3)z}$$

$$A_{n} = \frac{1}{1+3z}$$



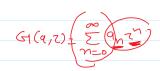
and 
$$a_{n+1} + 2a_n = 0$$
 find the generating function also find the Son.

The Son.

 $a_{n+2} - 3a_{n+1} + 2a_n = 0$  find the generating function also find the Son.

 $a_{n+2} - 3a_{n+1} + 2a_n = 0$  find the generating function also find the Son.





Son The given recurrence relation is.

$$a_{n+2} - 3 a_{n+1} + 2 a_n = 0$$

Multiply both sides by zn.

$$a_{m+2} z^{m} - 3 a_{m+1} z^{m} + 2 a_{m} z^{m} = 0$$

$$\sum_{n=0}^{\infty} a_{n+2} z^{n} - 3 \sum_{n=0}^{\infty} a_{n+1} z^{n} + 2 \sum_{n=0}^{\infty} a_{n} z^{n} = 0$$

$$\left[a_{1}z^{2} + a_{3}z^{2} + a_{4}z^{2} + \cdots - \infty\right] - 3\left[a_{1}z^{2} + a_{2}z^{2} + a_{3}z^{2} + \cdots + a_{3}z^{2} + \cdots + a_{3}z^{2}\right] + 2G(a_{1}z) = 0$$

$$\left[\frac{a_{2} + a_{3}z + a_{4}z^{2} + \dots + a_{5}z^{2} + \dots +$$

$$\frac{(2)}{2} \left[ a_2 + a_3 z + a_4 z^2 + \dots \right] - \frac{3z}{z} \left[ a_1 + a_2 z + a_3 z^2 + \dots \right] + 2 G_1(a_1 z) = 0$$

$$\frac{1}{z^2} \left[ a_2 z^2 + a_3 z^2 + a_4 z^2 + \dots \right] - \frac{3}{z} \left[ a_1 z + a_2 z^2 + a_3 z^2 + \dots \right] + \frac{1}{2} (a_1 z) = 0$$

$$\frac{1}{Z^{2}} \left[ G(a/z) - a_{0} - a_{1}z \right] - \frac{3}{Z} \left[ G(a/z) - a_{0} \right] + 2 G(a/z) = 0$$

$$[1-37+22]6(9/2)-a_0-a_17+3e_07=0$$

$$\left[1-3z+2z^{2}\right]\eta(a/z)-z=0$$

$$G_{1}(a/2) = \frac{2}{2z^{2}-3z+1}$$

$$= \frac{7}{2^2 - 27 - 24}$$

$$= \frac{z}{2z(z-1)-1(z-1)}$$

$$= \frac{z}{(2z-1)(z-1)}$$

$$= \frac{y_2}{(2z-1)(\frac{1}{2}-1)} + \frac{1}{(2-1)(z-1)}$$

$$= \frac{y_2}{(2z-1)} + \frac{1}{z-1}$$

$$G_1(a_1z) = \frac{1}{1-a_2} - \frac{1}{1-a_2}$$

$$G_{\eta} = (2)^{\eta} - (1)^{\eta}.$$

$$\begin{array}{lll}
& a_{n} = \sum_{m=1}^{\infty} \frac{1}{m} + (a_{m-2} = 0) & a_{0} = \sum_{m=1}^{\infty} \frac{1}{m} & a_{m-1} = \sum_{m=1}^{\infty} \frac{1}{m} & a_{m-1$$

$$(\zeta z^{2} - 5z + 1) (\zeta_{1}(a_{1}z) = 1 - 3z)$$

$$= \frac{(1 - 3z)}{(\zeta z^{2} - 3z - 2z + 1)}$$

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

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

$$C_{1}(a_{1}z) = \frac{1}{1 - 2z}$$

$$C_{2}(a_{1}z) = \frac{1}{1 - 2z}$$