

Chapter 8

- Solve the following recurrence relations.
 - $a_n = a_{n-1} + 6a_{n-2}$, where $a_0 = 0$ and $a_1 = 1$.
 - $a_n = -3a_{n-1} - 2a_{n-2}$, where $a_0 = 0$ and $a_1 = 1$.
 - $a_n = -5a_{n-1} + 6a_{n-2}$, where $a_0 = 0$ and $a_1 = 1$.
- Solve the following recurrence relations.
 - $a_n = 2a_{n-1} - a_{n-2}$, where $a_0 = 0$ and $a_1 = 1$.
 - $a_n = -2a_{n-1} - a_{n-2}$, where $a_0 = 0$ and $a_1 = 1$.
 - $a_n = -3a_{n-1} - \frac{9}{4}a_{n-2}$, where $a_0 = 0$ and $a_1 = 1$.
- Solve the following recurrence relations.
 - $a_n = 10a_{n-1} - 21a_{n-2}$, where $a_0 = 0$ and $a_1 = 1$.
 - $a_n = a_{n-2}$, where $a_0 = 0$ and $a_1 = 1$.
 - $a_n = 6a_{n-1} - 9a_{n-2}$, where $a_0 = 0$ and $a_1 = 1$.
- Solve the following recurrence relations.
 - $a_n = 2a_{n-1} + a_{n-2} - 2a_{n-3}$, where $a_0 = 0$, $a_1 = 1$ and $a_2 = 2$.
 - $a_n = -a_{n-1} + 4a_{n-2} + 4a_{n-3}$, where $a_0 = 0$, $a_1 = 1$ and $a_2 = 2$.
 - $a_n = 6a_{n-1} - 11a_{n-2} + 6a_{n-3}$, where $a_0 = 0$, $a_1 = 1$ and $a_2 = 2$.
- What do we get if the characteristic equation of a homogeneous linear recurrence relation is $r^2 - 2r$?
- Solve the following recurrence relations.
 - $a_n = 3a_{n-1} - 3a_{n-2} + a_{n-3}$, where $a_0 = 0$, $a_1 = 1$ and $a_2 = 2$.
 - $a_n = 3a_{n-1} - 4a_{n-3}$, where $a_0 = 0$, $a_1 = 1$ and $a_2 = 2$.
 - $a_n = 3a_{n-2} + 2a_{n-3}$, where $a_0 = 0$, $a_1 = 1$ and $a_2 = 2$.
- Solve the following recurrence relation : $a_n = -a_{n-2}$, where $a_0 = 0$ and $a_1 = 1$.
- Solve the following recurrence relations.
 - $a_n = 12a_{n-1} - 35a_{n-2} + n^2$, where $a_0 = 0$ and $a_1 = 1$.
 - $a_n = 8a_{n-1} - 16a_{n-2} + 2019n$, where $a_0 = 0$ and $a_1 = 1$.
 - $a_n = 16a_{n-2} + 5$, where $a_0 = 0$ and $a_1 = 1$.
 - $a_n = 4a_{n-1} - 4a_{n-2} + 3^n$, where $a_0 = 0$ and $a_1 = 1$.
- Solve the following recurrence relations.
 - $a_n = -3a_{n-1} - 2a_{n-2} + n2^n$, where $a_0 = 0$ and $a_1 = 1$.
 - $a_n = 6a_{n-1} - 12a_{n-2} + 8a_{n-3} + (n+2)2^n$, where $a_0 = 0$, $a_1 = 1$ and $a_2 = 2$.
 - $a_n = -2a_{n-1} - a_{n-2} + (n^2 + 1)2^n$, where $a_0 = 0$ and $a_1 = 1$.

(d) $a_n = 3a_{n-1} - 4a_{n-3} + (n + 4)2^n$, where $a_0 = 0$, $a_1 = 1$ and $a_2 = 2$.

10. Solve the following recurrence relations (give the answer using O notation).

(a) $T(n) = T(n/2) + 1$

(b) $T(n) = 2T(n/2) + 1$

(c) $T(n) = 2T(n/2) + n$

(d) $T(n) = 8T(n/2) + n^2$

(e) $T(n) = 3T(n/2) + 4n + 1$

11. Solve the following recurrence relations.

(a) $a_n = a_{n-1} + \frac{1}{2^n}$, where $a_1 = 1$.

(b) $a_n = a_{n-1} + \frac{n}{2^n}$, where $a_1 = 1$.