1. Q — Find the general solution of the recurrence equation $g_{n+2} = 3g_{n+1} - 2g_n$.

A — The recurrence can be written as a homogenous equation, $g_{n+2} - 3g_{n+1} + 2g_n = 0$. On summating:

$$\sum_{n=0}^{\infty} g_{n+2} - 3\sum_{n=0}^{\infty} g_{n+1} + 2\sum_{n=0}^{\infty} g_n = 0 \tag{1}$$

$$\begin{aligned}
\sum_{n=0}^{\infty} g_{n+1}x^n &= g_1 + g_2x + g_3x^2 + g_4x^3 + \cdots \\
x\sum_{n=0}^{\infty} g_{n+1}x^n &= g_1x + g_2x^2 + g_3x^3 + g_4x^4 + \cdots \\
&= f(x) - g_0 \\
\therefore \sum_{n=0}^{\infty} g_{n+1}x^n &= \frac{f(x) - g_0}{x}
\end{aligned}$$

$$\boxed{r_n = \frac{g_0 - g_1}{2}(-1)^n + \frac{g_0 + g_1}{2}}$$

2. Q — Find the general solution of the recurrence equation $g_{n+2} = 3g_{n+1} - 2g_n$.

A — The recurrence can be written as a homogenous equation,