

1. Solve the linked system  $F_{n+1} = F_n + 3G_n$ ,  $G_{n+1} = 4F_n + 2G_n$ ,  $F_0 = 0$ ,  $G_0 = 1$ .

2. Solve the recurrence  $F_{n+2} = 8F_{n+1} - 16F_n$ ,  $F_0 = 1$ ,  $F_1 = 2$ .

EXTRA CREDIT: Work backwards! Suppose that  $g_n = x^n + y^n$  is a solution to

$$g_{n+2} = Ag_{n+1} + Bg_n, \quad g_0 = C, \quad g_1 = D.$$

Find  $A$ ,  $B$ ,  $C$ , and  $D$ .