Problem: Given A, B, and n. Find :

$$\sum_{i=0}^{n} F_{A+i}F_{B+i}$$

$$k = A - B \tag{1}$$

$$F_A F_B = F_{k+1}F_A^2 + F_k F_A F_{A-1} \tag{2}$$

$$\sum_{i=0}^{n} F_i^2 = F_{n+1}F_n \tag{3}$$

$ev(n)$ = returns 1 if n is even.

$$\sum_{i=0}^{n} F_i F_{i+1} = F_{n+1}^2 - ev(n) \tag{4}$$

$$\sum_{i=0}^{n} F_i F_{i-1} = \sum_{i=0}^{n-1} F_i F_{i+1} \tag{5}$$

$$\sum_{i=0}^{n} F_{A+i}F_{B+i} = \sum_{i=0}^{n} F_{k+1}F_{A+i}^2 + \sum_{i=0}^{n} F_k F_{A+i}F_{A+i-1} \tag{6}$$

$$\sum_{i=0}^{n} F_{A+i}F_{B+i} = F_{k+1}\sum_{i=0}^{n} F_{A+i}^2 + F_k \sum_{i=0}^{n} F_{A+i}F_{A+i-1} \tag{7}$$

$$\sum_{i=0}^{n} F_{A+i}F_{B+i} = F_{k+1}F_{A+n-1}F_{A+n} - F_{k-1}F_{A-1}F_A + F_k \sum_{i=0}^{n} F_{A+i}F_{A+i-1} \tag{8}$$

$$\sum_{i=0}^{n} F_{A+i}F_{B+i} = F_{k+1}F_{A+n-1}F_{A+n} - F_{k-1}F_{A-1}F_A + F_{A+n-2}^2 - ev(A+n-2) + F_{A+-2}^2 - ev(A-2) \tag{9}$$