

1. Give a combinatorial interpretation of the coefficient of x^9 in $(1+x+x^2+x^3+\dots)^3$. What is this number?

2. Find the # of ways to make change for \$1 using only dimes and quarters, using generating functions.

3. Solve $a_k = 3a_{k-1} + 2$, $a_0 = 1$ with generating functions.

4. Show if $G(x)$ is the generating function for the Catalan numbers, $xG(x)^2 - G(x) + 1 = 0$.

Show that $G(x) = \frac{1 - \sqrt{1-4x}}{2x}$ (given $C_0 = C_1 = 1$)