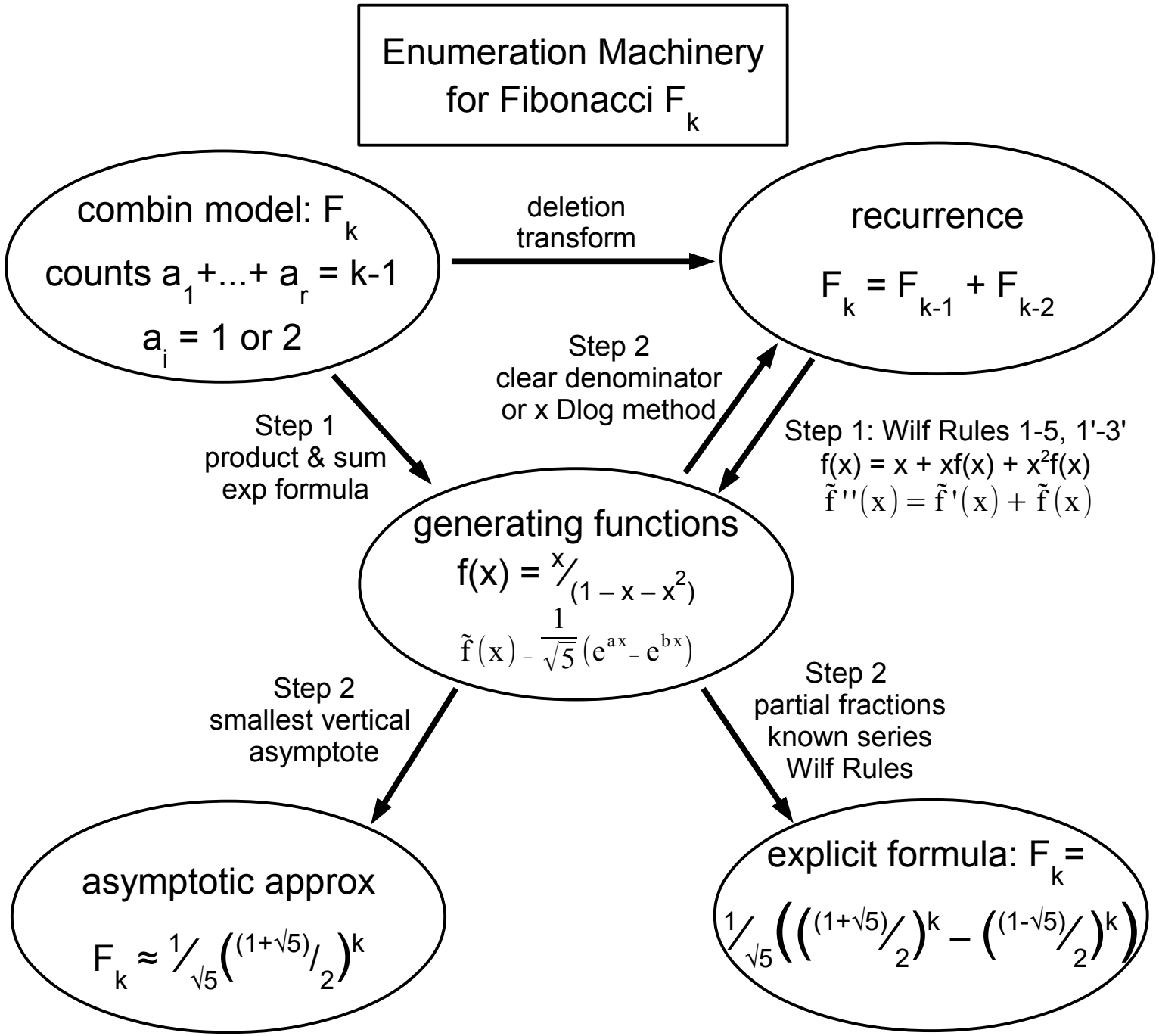
Enumeration Machinery for Fibonacci F_k
combin model: F_k
counts $a_1 + \ldots + a_r = k-1$
$a_i = 1$ or 2
deletion transform
recurrence
$F_k = F_{k-1} + F_{k-2}$
Step 2
clear denominator
or x Dlog method
Step 1
product & sum
exp formula
Step 1: Wilf Rules 1-5, 1'-3'
$f(x) = x + xf(x) + x^2 f(x)$
$\tilde{f}''(x) = \tilde{f}'(x) + \tilde{f}(x)$
generating functions
$f(x) = x/(1 - x - x^2)$
$\tilde{f}(x) = \frac{1}{\sqrt{5}}(e^{ax} - e^{bx})$
Step 2
smallest vertical
asymptote
Step 2
partial fractions
known series
Wilf Rules
asymptotic approx
$F_k \approx 1/\sqrt{5}\left((1+\sqrt{5})/2\right)^k$
explicit formula: $F_k =$
$1/\sqrt{5}\left(\left((1+\sqrt{5})/2\right)^k - \left((1-\sqrt{5})/2\right)^k\right)$