## Agenda

- · Average case analysis of quicksort
  - Camouflage for the technique of summation
- The Fibonacci sequence (or Virahanka sequence) is the celebrated equation g(n) = g(n-1) + g(n-2)
  - What is the runtime of the "natural" algorithm
  - Camouflage for the method of generating functions

$$F(Z) = \frac{Z}{|-Z-Z^2|}$$

$$1 + \beta z + \beta^2 z^2 + \dots = \frac{1}{|-AZ|} \iff \beta^n$$

$$1 + \beta z + \beta^2 z^2 + \dots = \frac{1}{|-BZ|} \iff \beta^n$$

$$\frac{Z}{|-Z-Z^2|} = \frac{A}{|-AZ|} + \frac{B}{|-BZ|} \iff \frac{1}{|-BZ|} \iff \frac{1}{|-BZ|} = \frac{A}{|-BZ|}$$

$$\Rightarrow A(L-BZ) + B(L-AZ) = Z \Rightarrow (A+B) + (-BP - BA)Z = Z$$

$$\Rightarrow A(a-B) = \Delta$$

$$\therefore -AB + AA = \Delta$$

$$\Rightarrow A(a-B) = \Delta$$

$$\varphi = \frac{1}{2} (1+\sqrt{5}) \qquad \overline{\varphi} = \frac{1}{2} (1-\sqrt{5})$$

$$1-z-z^2 = (1-\varphi z) (1-\overline{\varphi} z)$$

$$\frac{1}{2} (1+\sqrt{5} - 1+\sqrt{5}) = \sqrt{5}$$

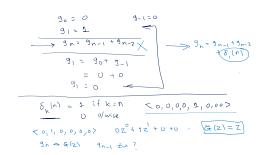
$$\therefore A = \sqrt{5}$$

$$\frac{9}{5} = \frac{9}{5} - 1 + \frac{9}{5} = \frac{1}{2} (1-\sqrt{5})$$

$$\frac{1}{2} (1+\sqrt{5}) = \sqrt{5}$$

$$\frac{1}{2} (1+\sqrt{5$$

Method.  $g_{-1} = J_{-2} = J_$ 



$$3(n-k) \iff \sum_{n\geq 0} g_{n-1} z^{n}$$

$$= \sum_{n\geq 0} (g_{0} + g_{1} z^{2} + \dots)$$

$$3(n-k) \qquad Z^{k}$$