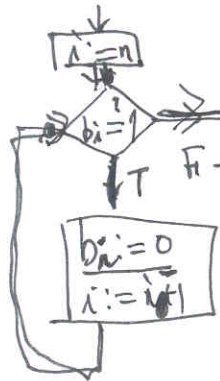


# 4/25. Next permutation and combination

next bit string,  $1, 2, 3$

$\{0, 1, 2, 3\}$   
 $010$      $011$      $101$      $01111$      $b_1, b_2, \dots, b_n$   
 $011$      $100$      $110$      $1000$      $\uparrow$



loop invariance?

Python

Consider  $\{0, 1, 2\}$

$\{0, \dots, 9\}$

$i := 3$   
 $i := 2$   
 $i := 1$

$011$   
 $b_1 \quad b_2 \quad b_3$   
 $1 \quad 0 \quad 0$

Next permutation

$a_1 a_2 \dots a_n$

$234156$   
 $a_{n-1} > a_n$

$234165$  2nd one  
 $a_{n-1} > a_n$   
 $a_{n-2} < a_{n-1}$

①  $a_j < a_{j+1} \wedge a_{j+1} > a_{j+2} > \dots > a_{n-1} > a_n$  5 6  $\rightarrow$  increasing

②  $a_j < a_k$

Find k

Next combination

$\{1, 2, 5, 6\}$

$\{1, 2, 3, 4, 5, 6\}$   
 $6 - 4 + 4 = 6$   
 $6 - 4 + 3 = 5$

$\times C_4$

$n + r - i = a_i \rightarrow$  last digit

$\{1, 3, 4, 5\}$

Chap 6. Discrete Probability

名字之集合

名字非常名

理  
物致知

文  
講意正心

⊕  
⋮

⋮

$$p = \frac{|E|}{|S|}$$