

1. pdf_get_index:

$$i = f(x, k), \quad x \in \mathbb{R}^n, x_i \geq 0, \forall i,$$

$$k \in \mathbb{R}, \text{sum}(x) = \sum x_i > 0.$$

$$k \in [0, \text{sum}(x))$$

$$\text{find } i, \text{ s.t., } \sum_{j=1}^{i-1} x_j \leq k < \sum_{j=1}^i x_j$$

solve: ① method 1.

$$s \leftarrow 0$$

$$\forall i \text{ in } \{1, \dots, n\}$$

$$s \leftarrow s + x_i$$

$$\text{if } k < s, \text{ return } i$$

return n

② method 2: $\forall i \in \{1, \dots, n\}$

$$k \leftarrow k - x_i$$

$$\text{if } k < 0, \text{ return } i$$

return n.