DGA Ü8

1) $a = [0, 1, 2, 3]$

(1) RECURSIVE-FFT(a) {

(2) $n = |a|$;

(3) if $n = 1$ { return a; }

(4) $\omega = e^{2\pi i / n}$; $\omega' = 1$;

(5) $y_0 = \text{RECURSIVE-FFT}([a_0, a_2, \dots, a_{n-2}])$;

(6) $y_1 = \text{RECURSIVE-FFT}([a_1, a_3, \dots, a_{n-1}])$;

(7) for $k = 0, \dots, \frac{n}{2} - 1$ {

(8) $y[k] = y_0[k] + \omega' y_1[k]$;

(9) $y[k + (n/2)] = y_0[k] - \omega' y_1[k]$;

(10) $\omega' = \omega' \omega$;

(11) }

(12) return y;

(13) }

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(1) $a = [0, 1, 2, 3]$

(2) $n = 4$

(4) $\omega = e^{\frac{\pi i}{2}}$; $\omega' = 1$

(5) → (1) $a = [0, 2]$

(2) $n = 2$

(4) $\omega = e^{\pi i}$; $\omega' = 1$

(5) → (1) $a = [0]$

(2) $n = 1$

(3) → $[0]$ ... y_0

(6) → (1) $a = [2]$

(3) → $[2]$ ... y_1

(7) $k = 0$

(8) $y[0] = 0 + 1 \cdot 2 = 2$

(9) $y[1] = -2$

(10) $\omega' = e^{\frac{\pi i}{2}}$

(11)

(12) → $[2, -2]$ ... y_0

(6) → (1) $a = [1, 3]$

(2) $n = 2$

(4) $\omega = e^{\pi i}$; $\omega' = 1$

(5) → (1) $a = [1]$

(3) → $[1]$ ... y_0

(6) → (1) $a = [3]$

(3) → $[3]$ ... y_1

(7) $k = 0$

(8) $y[0] = 1 + 1 \cdot 3 = 4$

(9) $y[1] = -2$

(12) → $[4, -2]$ ... y_1

(7) $k = 0$

(8) $y[0] = 2 + 1 \cdot 4 = 6$

(9) $y[2] = 2 - 1 \cdot 4 = -2$

(10) $\omega' = e^{\frac{\pi i}{2}}$

(7) $k = 1$

(8) $y[1] = -2 + (-2) e^{\frac{\pi i}{2}} = -2 - 2i$

(9) $y[3] = -2 - (-2) e^{\frac{\pi i}{2}} = -2 + 2i$

(11)

(12) → $[6, -2-2i, -2, -2+2i]$

(13)