

長庚大學期中、期末考試答案用紙

科目

學年度 第 學期 考 卷 2 系 姓名 江 彥 琦 學號 B-71212

3) a) 褶積定理 又稱迴旋積分 $\mathcal{L}[f(t) \times g(t)] = \mathcal{L}[f(t)] \cdot \mathcal{L}[g(t)] = F(s) \cdot G(s)$

$$\begin{aligned} b) \mathcal{L}[f(t) \times g(t)] &= \int_0^\infty \int_0^t f(t-\tau) g(\tau) d\tau e^{-st} dt \\ &= \int_0^\infty f(t) \int_t^\infty g(t-\tau) e^{-st} dt d\tau \\ \text{令 } t-\tau=x, dt=d\tau &= \int_0^\infty f(t) \int_0^\infty g(\tau) e^{-s(t+\tau)} d\tau dt \\ &= \int_0^\infty g(\tau) e^{-s\tau} d\tau \int_0^\infty f(t) e^{-st} dt \\ &= G(s) \cdot F(s) \end{aligned}$$

1) "DFT"

import math

def iexp(n):

return complex(math.cos(n), math.sin(n))

def dft(xs): "native dft"

n = len(xs)

return [sum((xs[k] * iexp(-2 * math.pi * i * k / n for k in range(n))) / n

for i in range(n)]

if __name__ == "__main__":

wave1 = [1, 0, 0, 0, 0, 0, 0]

wave2 = [1, 1, 1, 1, 1, 1, 1]

wave3 = [1, -1, 1, -1, 1, -1, 1]

wave4 = [1, 0, 1, 0, 1, 0, 1]

dfreq5 = [1, 0, 0, 0, 0, 0, 1]

dfreq6 = [1, 1, 0, 0, 0, 0, 1]

dfreq1 = dft(wave1)

dfreq2 = dft(wave2)

(請翻面繼續作答)

$f(x) = 10x$
 $f^{-1}(x) = \frac{x}{10}$
 $f^{-1}(f(x)) = x$
 $f(f^{-1}(x)) = x$

[illegible]

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dfreq3 = dfc(wave3)
dfreq4 = dfc(wave4)
wave5 = dfbind(dfreq3)
wave6 = dfbind(dfreq6)
print(dfreq1)
print(dfreq2)
print(dfreq3)
print(dfreq4)
print(wave1)
print(wave6)
pass
```

(請翻面繼續作答)

$$2. (a) h(n) = t(n)g(n) + k(n)g(n) + t(n)g(n)$$

$$b) x = \text{np.array}([1,1,1,1])$$

$$w = \text{np.array}([1,1])$$

$$y = \text{np.convolve}$$

y

$$\text{output} = \text{array}([1,2,2,2,1])$$

$$(c) x = \text{tp.fft}(x)$$

x

$$\text{output} = \text{array}([4, -0.5, 10, 0], [0, -0.5, 0, -0.5])$$

$$w = \text{tp.fft}(w)$$

w

$$\text{output} = \text{array}([2, -0.5], [0, -1.5])$$

$$y = \text{tp.fft}(y)$$

y

$$\text{output} = \text{array}([8, -0.5], [-1.309, -0.971], [-0.91, -0.588])$$

$$= 0.191 + 0.588j, -1.291 + 0.588j$$

80, assigned