



정보통신 수학 및 실습

Lab assignment



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Chapter 13 Lab Assignment(DFT & FFT)

1. Let $x(t)$ be the following function:

$$x(t) = \begin{cases} 1 & 0 \leq t \leq \frac{\pi}{2} \\ \cos(6\pi - t - \frac{\pi}{2}) & \frac{\pi}{2} \leq t \leq \frac{3\pi}{2} \\ -1 & \frac{3\pi}{2} \leq t \leq 2\pi \end{cases}$$

- Plot $x(t)$ where $t=[0:0.001:2*\pi]$.
 - Plot $\text{abs}(\text{fft}(x(t)))$ where x-axis is labeled as radian.
 - Let the sampling frequency is 30 Hz. Plot $x(nT_s)$ where $0 < t < 2\pi$.
 - Plot $\text{abs}(\text{fft}(x(nT_s)))$ where x-axis is labeled as radian.
 - Let the sampling frequency is 5 Hz. Plot $x(nT_s)$ where $0 < t < 2\pi$.
 - Plot $\text{abs}(\text{fft}(x(nT_s)))$ where x-axis is labeled as radian.
 - Compare the results of b, d, f and describe your findings.
2. Answer the following questions about $x(n)$ where $x(n) = (0.3)^n$, $n = 0, 1, 2$, and 3 and $x(n)=0$ otherwise.
- Program 4-points fft of $x(n)$.
 - Find DFT of $x(n)$ using $\text{fft}()$ and compare the result of (a)