정보통신 수학 및 실습
Lab assignment

학번 :	2016110056	2012112130
이름 :	박승원	노희승
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dongguk UNIVERSITY

Chapter 13 Lab Assignment(DFT & FFT)

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

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

a) Plot x(t) where t=[0:0.001:2*pi].

b) Plot abs(fft(x(t)) where x-axis is labeled as radian.

c) Let the sampling frequency is 30 Hz. Plot x(nTs) where $0 < t < 2$‘.

d) Plot abs(fft(x(nTs)) where x-axis is labeled as radian.

e) Let the sampling frequency is 5 Hz. Plot x(nTs) where $0 < t < 2$‘.

f) Plot abs(fft(x(nTs)) where x-axis is labeled as radian.

g) 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.

a) Program 4-points fft of x(n).

b) Find DFT of x(n) using fft() and compare the result of (a)