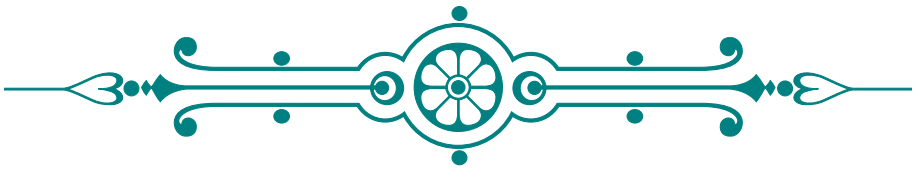

정보통신 수학 및 실습
Homework

학번 : 2016110056

학과 : 불교학부

이름 : 박승원

날짜 : 2017년 3월 20일

Chapter 3 Homework

1. Simplify the following equations.

a) $\cos(100\pi t)\cos(500\pi t) = \dfrac{\cos(600\pi t) + \cos(400\pi t)}{2}$

$e^{i\theta} = \cos\theta + i\sin\theta$

$e^{i\alpha} \times e^{i\beta} = (\cos\alpha + i\sin\alpha)(\cos\beta + i\sin\beta)$

$e^{i(\alpha+\beta)} = \cos\alpha\cos\beta - \sin\alpha\sin\beta + i(\sin\alpha\cos\beta + \cos\alpha\sin\beta) = \cos(\alpha+\beta) + i\sin(\alpha+\beta)$

$\therefore \cos(\alpha+\beta) = \cos\alpha\cos\beta - \sin\alpha\sin\beta$

$\sin(\alpha+\beta) = \sin\alpha\cos\beta + \cos\alpha\sin\beta$

$\cos(\alpha-\beta) = \cos\alpha\cos\beta + \sin\alpha\sin\beta$

$\sin(\alpha-\beta) = \sin\alpha\cos\beta - \cos\alpha\sin\beta$

$\therefore \cos(\alpha+\beta) + \cos(\alpha-\beta) = 2\cos\alpha\cos\beta$

$\cos\alpha\cos\beta = \dfrac{\cos(\alpha+\beta) + \cos(\alpha-\beta)}{2}$

$\sin\alpha\cos\beta = \dfrac{\sin(\alpha+\beta) + \sin(\alpha-\beta)}{2}$

b) $4sin(200\pi t)cos(300\pi t) = -2\sin(500\pi t)\sin(100\pi t)$

2. Find the frequency of the following signals.

a) $\sin(t)$

$2\pi f = 1$

$\therefore f = \dfrac{1}{2\pi}$

b) $\cos(600\pi t)$

$2\pi f = 600\pi$

$\therefore f = 300$

3. Evaluate the following functions.

a) $sin(\pi/4)$

$\dfrac{\sqrt{2}}{2}$

b) $tan(\pi)$

0

4. Let the information signal $m(t) = 4\sin(200\pi t)$
and the carrier signal $c(t) = \cos(2 \times 10^6 \pi t)$.
Simplify the transmission signal $x(t) = m(t)c(t)$ and find its frequencies.
Plot the magnitude of each frequency in the frequency domain.

$x(t) = 4\sin(200\pi t)\cos(2 \times 10^6 \pi t) = 2(\sin(2 \times 10^6 \pi + 200\pi)t) + \sin(2 \times 10^6 \pi - 200\pi)t))$
$\therefore f = 10^6 \pm 100$