

ARAB ACADEMY FOR SCIENCE & TECHNOLOGY COLLEGE OF ENGINEERING & TECHNOLOGY

Electronics & Communications Engineering Department

Course: Spectral Analysis (Lab.)

Course Code: EC 321

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Sheet #1

1- On the same figure plot the two functions x, y.

Where, $x = Cos (2 \pi 50t)$

$$y = Sin (2 \pi 50t)$$

and t ranges from 0 to 2/50 with 1000 points.

Use the appropriate range for the x & y axes and label them as 'time' and 'amplitude' respectively.

2- Plot each of the following functions using the same ranges and labels of question 1, then verify your answer using the mathematical formulas listed below:

a-
$$\cos^2 (2 \pi 50t)$$

b-
$$\sin^2 (2 \pi 50t)$$

c-
$$\cos^3 (2 \pi 50t)$$

d- Cos $(2 \pi 50t)$ Cos $(2 \pi 100t)$

e- Sin
$$(2 \pi 50t)$$
 Sin $(2 \pi 100t)$

f- Sin $(2 \pi 100t)$ Cos $(2 \pi 50t)$

Mathematical Formulas:

$$\cos^2(\Theta) = 0.5 [1 + \cos(2\Theta)]$$

$$\sin^2(\Theta) = 0.5 [1 - \cos(2\Theta)]$$

$$\cos^3(\Theta) = \frac{3}{4} \cos(\Theta) + \frac{1}{4} \cos(3\Theta)$$

Cos(a) Cos(b) = 0.5 [Cos (a-b) + Cos (a+b)]

$$Sin(a) Sin(b) = 0.5 [Cos (a-b) - Cos (a+b)]$$

Sin(a) Cos(b) = 0.5 [Sin (a-b) + Sin (a+b)]