

Quiz 1: Introduction to Communications & Review of Signals & Systems

Name: **KEY**

ver. 2

a)

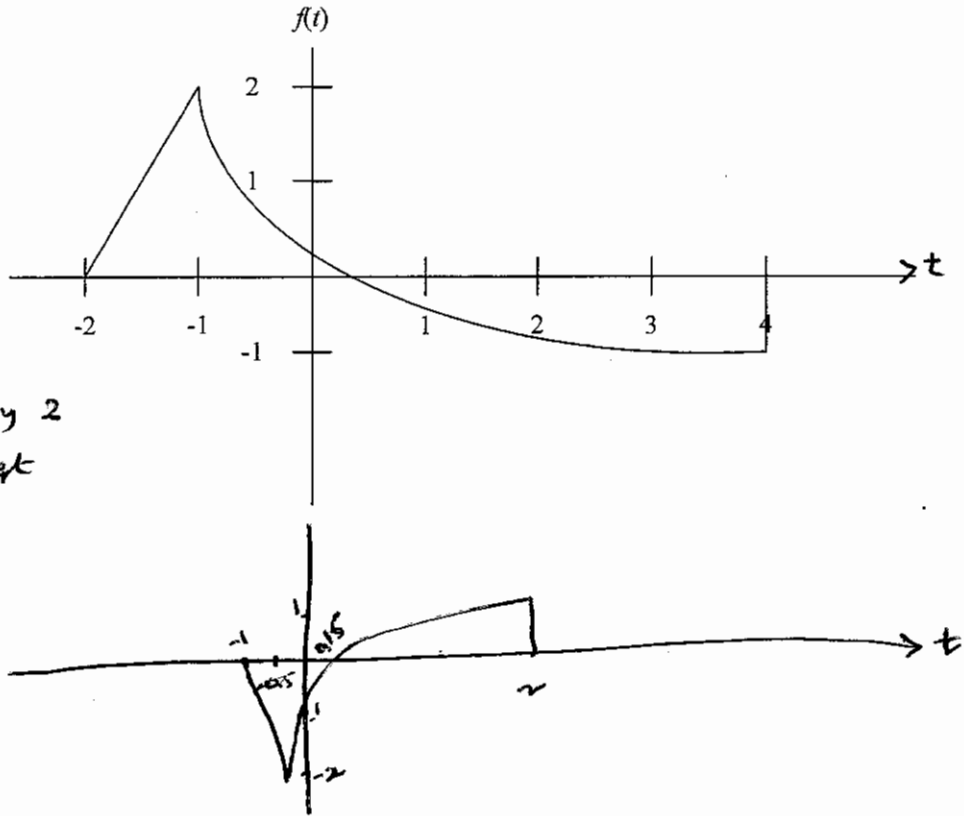
The signal $f(t)$ is shown in the figure, sketch $-f(2t)$. Show all important values (4 points)

$t = 2t'$
 $\Rightarrow t' = \frac{t}{2}$

t	-2	-1	0.5	1
$f(t)$	0	2	0	-1
t'	-1	-0.5	0.15	0.5
$-f(t)$	0	-2	0	+1

compress by 2

* Signal by 2
 * amplitude invert

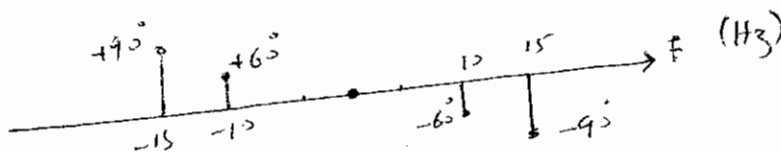
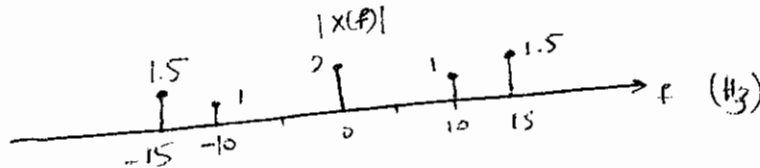


b) Given the following signal $x(t) = 2 + 2 \cos(20\pi t - 60^\circ) + 3 \sin(30\pi t)$

Sketch the double sided magnitude and phase spectra of $x(t)$ (4 points)

What is the signal power? (2 points)

$x(t) = 2 + 2 \cos(2\pi(10)t - 60^\circ) + 3 \cos(2\pi(15)t - 90^\circ)$ *our reference is cos*



Signal power = $2^2 + \frac{2^2}{2} + \frac{3^2}{2} = 4 + 2 + 4.5 = 10.5$

= $(1.5)^2 + (1)^2 + 2^2 + 1^2 + (1.5)^2 = 2.25 + 1 + 4 + 1 + 2.25 = 10.5$

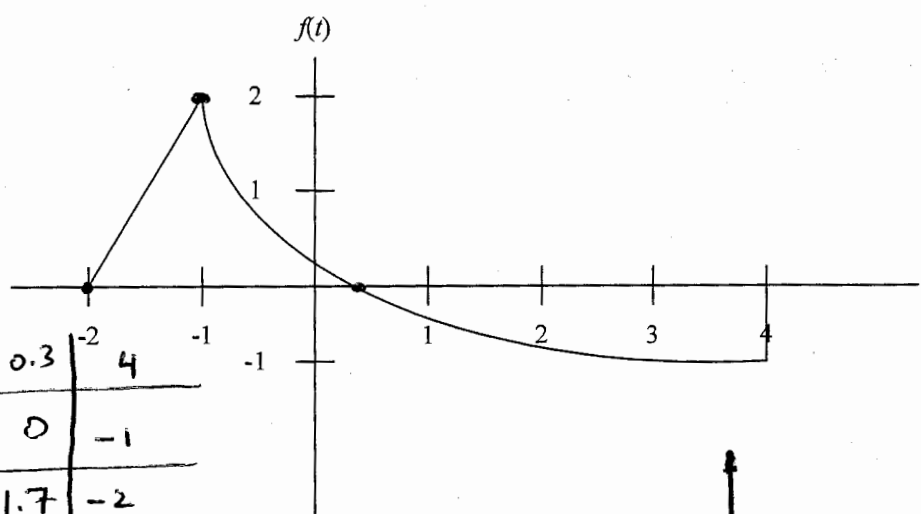
[or]

Quiz 1: Introduction to Communications & Review of Signals & Systems

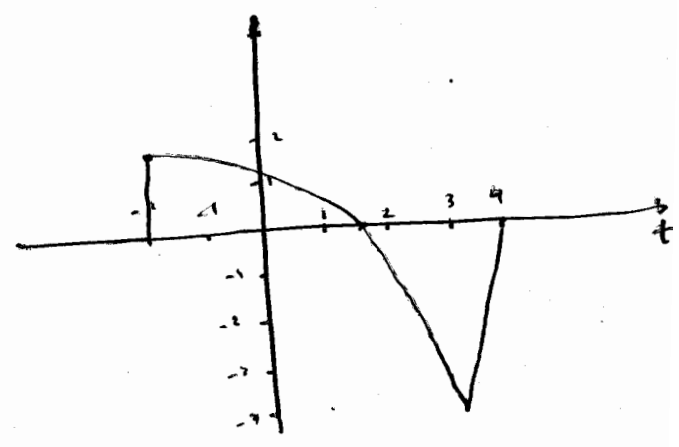
Name: **KEY**

a) The signal $f(t)$ is shown in the figure, sketch $-2f(2-t)$. Show all important values (6 points)

$t' = 2 - t$
 $t' = 2 - t$



t	-2	-1	0.3	4
$f(t)$	0	2	0	-1
t'	4	3	1.7	-2
$-2f(t')$	0	-4	0	+2



- * Time shifting left two units
- * Time reversal
- * amplitude scaling by 2 & amplitude reversal.

b) Given the following signal $x(t) = 2 + 2 \cos(20\pi t - 60^\circ) + 3 \sin(30\pi t)$

Sketch the single sided magnitude and phase spectra of $x(t)$ (4 points)

$x(t) = 2 + 2 \cos(2\pi(10)t - 60^\circ) + 3 \cos(2\pi(15)t - 90^\circ)$

