ECS 332: Principles of Communication

missin a dii (i), (ii), (iii), (iv).

NAME ?

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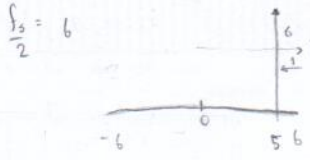
Problem 1. Find the "perceived" frequency when we sample the following signals at sampling rate $f_s = 12$ [Sa/s]

$f_s = 1/T$

a) the signal $\cos(2\pi(1{,}111{,}111)t)$

$T_s = \frac{1}{12} = 0.0833$

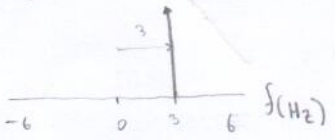
$B = 1{,}111{,}111$ Hz



$\frac{1{,}111{,}111}{12} = 92{,}592.58333$ → $7/12$

∴ The perceived is 5 Hz

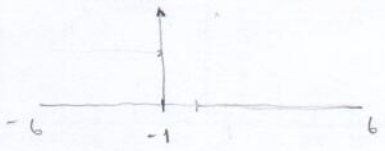
b) the signal $\cos(2\pi(111{,}111)t)$



$\frac{111{,}111}{12} = 9{,}259.25$ → $0.25 \times 12 = 3/12$

The perceived is 3 Hz

c) the signal $e^{j2\pi(11{,}111)t}$

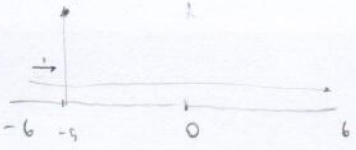


$11{,}111 - 6 = 11105$

$\frac{11105}{2} = 925.4166$ → $5/12$

∴ Perceived is -1 Hz

d) the signal $e^{-j2\pi(1{,}111)t}$



$1{,}111 - 6 = 1105$

$92 \times 12 = 1104$

$\frac{1105}{2} = 92.083$ → 1

∴ Perceived is at -5 Hz