QUIZ 1

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Download all latex-tikz codes from

https://github.com/vaibhavchhabra25/EE3900–course/blob/main/QUIZ–1/main.tex

Download all python codes from

https://github.com/vaibhavchhabra25/EE3900–course/blob/main/QUIZ–1/codes

1 Problem

(2.28 (a)) Determine if signal $x[n] = e^{j(2\pi n/5)}$ is periodic. If so, find the period.

2 Solution

A signal $x[n]$ is periodic if for some integer N,

$$x[n] = x[n+N] \tag{2.0.1}$$

And then, the period of the signal is N. Given,

$$x[n] = e^{j(2\pi n/5)} \tag{2.0.2}$$

For this to be periodic,

$$e^{j(2\pi n/5)} = e^{j(2\pi(n+N)/5)} \tag{2.0.3}$$

$$\implies e^{j(2\pi n/5)} = e^{j(2\pi n/5+2\pi N/5)} \tag{2.0.4}$$

$N/5$ must be an integer so that the equality holds. So, for an integer k,

$$N/5 = k \implies N = 5k \tag{2.0.5}$$

So, the function is periodic.
For fundamental period, $k = 1$.
So, the period of the signal is $N = 5$.

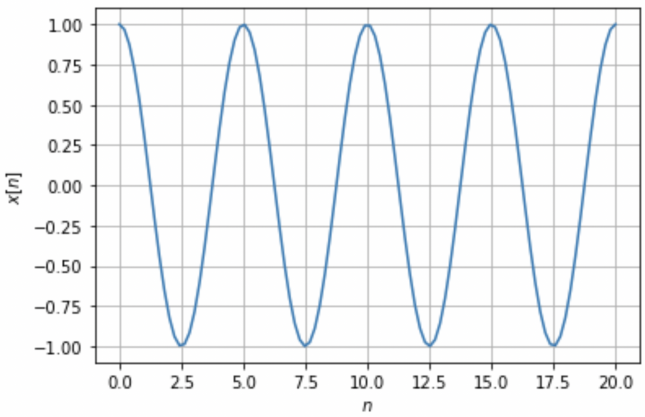

Fig. 0: Plot for $x[n] = e^{j(2\pi n/5)}$