

# 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  $x[n] = \exp j(2\pi n/5)$  is periodic. If so, find the period.

## 2 SOLUTION

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

$$x[n] = x[n + N] \quad (2.0.1)$$

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

$$x[n] = \exp j(2\pi n/5) \quad (2.0.2)$$

For this to be periodic,

$$\exp j(2\pi n/5) = \exp j(2\pi(n + N)/5) \quad (2.0.3)$$

$$\implies \exp j(2\pi n/5) = \exp j(2\pi n/5 + 2\pi N/5) \quad (2.0.4)$$

$N/5$  must be an integer so that the equality holds.

So, for an integer  $k$ ,

$$N/5 = k \implies N = 5k \quad (2.0.5)$$

So, the function is periodic.

For fundamental period,  $k = 1$ .

So, the period of the signal is  $N = 5$ .

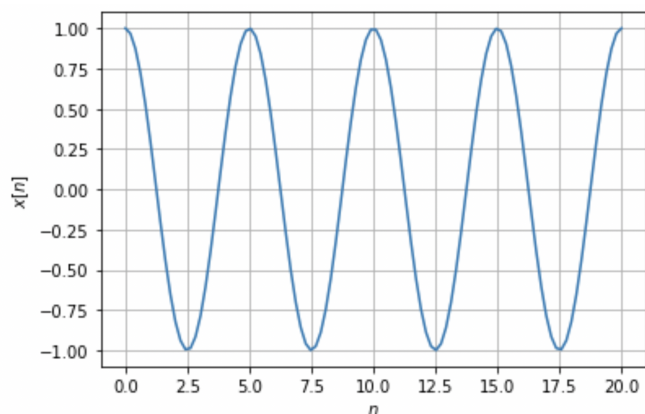


Fig. 0: Plot for  $x[n] = \exp j(2\pi n/5)$