Quiz 1

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Download python codes from

https://github.com/harithar1234/EE3900−Haritha/tree/main/quiz1/codes

1 Discrete Time Signal Processing 2.28(b)

Determine if $x[n] = \sin\frac{\pi n}{19}$ is periodic. If it is periodic, determine it's period.

2 Solution

Yes, the signal is periodic.Note that the amplitude function repeats itself at an interval of 19.Hence the amplitude of the signal is periodic with period 19.Note that the phase function repeats itself at an interval of 38.Hence the phase of the signal is periodic with period 38.
If the signal is periodic, then it must have the same amplitude and phase after some time interval. The time interval here is 38.Hence the signal is periodic with period 38.

$$\sin\frac{\pi}{19}(n+38) = \sin\frac{\pi}{19}(n) \tag{2.0.1}$$

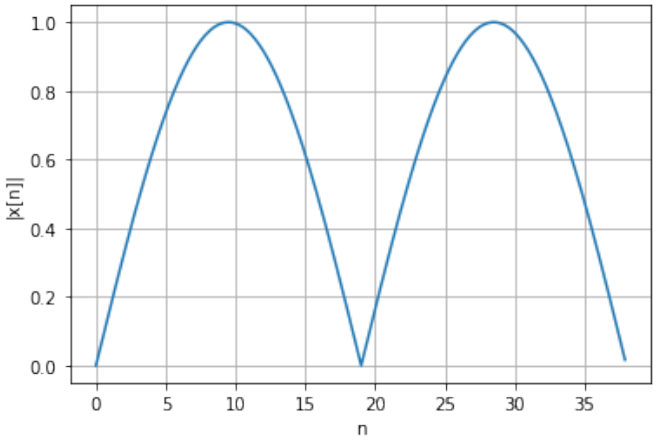

Fig. 0: Amplitude of x[n]

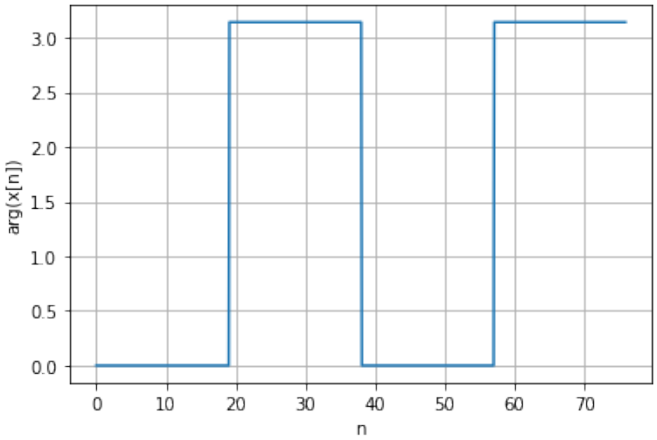

Fig. 0: Phase of x[n]