

# EE3900 Quiz-2

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Download all python codes from

<https://github.com/vrahul02/EE3900/tree/main/Quiz-2/Codes>

and latex-tikz codes from

<https://github.com/vrahul02/EE3900/tree/main/Quiz-2/Quiz-2.tex>

$g[11]$  is simply the coefficient in front of  $z^{-11}$  in this power series expansion of  $G(z)$ :

$$g[11] = -\frac{1}{11!} + \frac{3}{9!} - \frac{2}{11!} \quad (0.0.8)$$

## PROBLEM 3.13

A causal sequence  $g[n]$  has the  $z$ -transform

$$G(z) = \sin z^{-1} (1 + 3z^{-2} + 2z^{-4}).$$

Find  $g[11]$ .

## SOLUTION

$$G(z) = \sin z^{-1} (1 + 3z^{-2} + 2z^{-4}) \quad (0.0.1)$$

Using the series expansion of  $\sin x$ ,

$$\sin x = x - \frac{x^3}{3!} + \frac{x^5}{5!} - \frac{x^7}{7!} + \dots \quad (0.0.2)$$

We get,

$$\sin -z = z^{-1} - \frac{z^{-3}}{3!} + \frac{z^{-5}}{5!} - \frac{z^{-7}}{7!} + \dots \quad (0.0.3)$$

$$G(z) = \left( z^{-1} - \frac{z^{-3}}{3!} + \frac{z^{-5}}{5!} - \frac{z^{-7}}{7!} + \dots \right) (1 + 3z^{-2} + 2z^{-4}) \quad (0.0.4)$$

**Definition 1.** The  $z$ -transform of a function is defined as

$$g[n]G(z) \quad (0.0.5)$$

$$G(z) = \sum_{n=-\infty}^{\infty} g[n]z^{-n} \quad (0.0.6)$$

So,

$$G(z) = \sum_n g[n] \times z^{-n} \quad (0.0.7)$$