# GATE - BM 22

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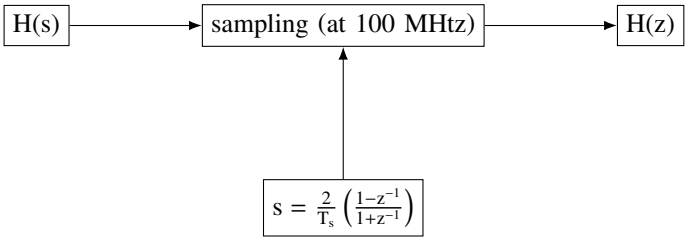
## Question

A continous time transfer function, H(s) = $\frac{1+\frac{s}{10^6}}{s}$ is coverted to a discrete time transfer function, H(z) using a bi-linear transformation at 100 MHz sampling rate. The pole of H(z) is located at z = ?

## Solution

| Variable | Condition |
|---|---|
| $F_s$ = 100 MHz | sampling rate |
| $T_s = \frac{1}{F_s}$ | sampling period |
| $s_0$ | pole of H(z) |

Table of Parameters




We know that,

$$H(z) = H(s)\Big|_{s=\frac{2}{T_s}\left(\frac{1-z^{-1}}{1+z^{-1}}\right)} \tag{1}$$

So, from (1)

$$H(z) = 5\times10^{-9}\left(\frac{201-199z^{-1}}{1-z^{-1}}\right) \tag{2}$$

So, $s_0$ is at z=1