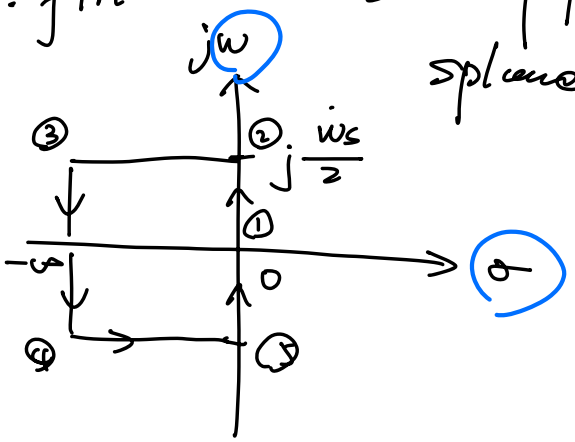
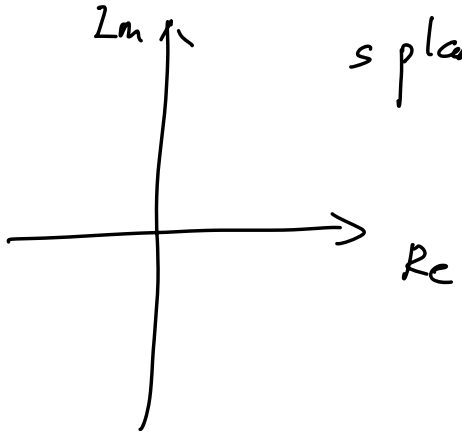
Example 4-1

Q: find the s mapping into z plane





formular $z = e^{sT}$ ☆ 背下来

$s = \sigma + j\omega$ ☆

$z = e^{T(\sigma + j\omega)}$

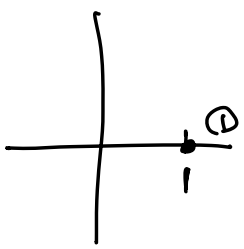
$= e^{T\sigma} e^{jT\omega}$

$= e^{T\sigma} \angle(T\omega)$

$= e^{T\sigma} e^{j(\omega T + 2k\pi)}$

Solution ① $\sigma = 0 \Rightarrow r = 1$

$j\omega = 0 \Rightarrow \omega = 0 \Rightarrow \angle = 0$

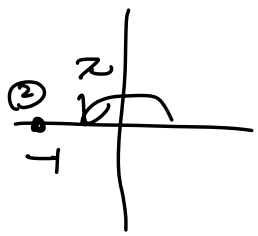


② $\sigma = 0 \Rightarrow r = 1$

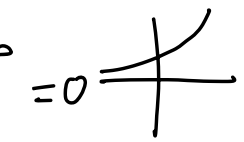
$\omega_s = \frac{2\pi}{T}$ $\frac{\omega_s}{2} = \frac{\pi}{T}$ let $T = 1$ 单位时间

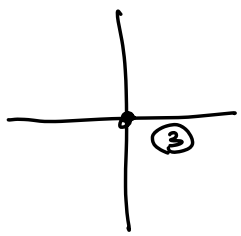
$w = \frac{w_s}{2} \Rightarrow \theta = Tw = \frac{Tw_s}{2}$

$w_s = \frac{2\pi}{T} \Rightarrow \theta = \frac{T\frac{2\pi}{T}}{2} = \pi$

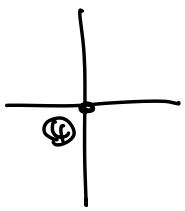


③ $\sigma = -\infty \Rightarrow r = e^{T\sigma} = e^{-\infty} = 0$





④ $\sigma = -\infty \Rightarrow r = 0$

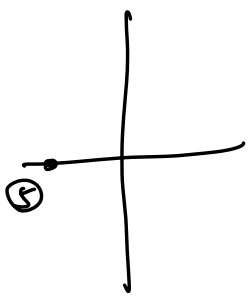


⑤ $\sigma = 0 \Rightarrow r = 1$

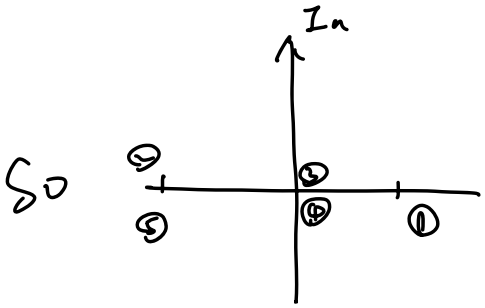
$w = \frac{-w_s}{2} \Rightarrow \theta = Tw = -T\frac{w_s}{2}$

$w_s = \frac{2\pi}{T} \Rightarrow \theta = -T\frac{\frac{2\pi}{T}}{2}$

$= -\pi$



So



取①②中点为⑥

⑥ $\sigma=0 \quad r=1$

$w=\frac{w_2}{4} \Rightarrow \theta=\angle TW=T\frac{w_2}{4}=T\frac{\frac{2\pi}{T}}{4}=\frac{\pi}{2}$