Routh's Method

Determine the **stability margin** of the following system, using **modified** Routh's method and **verify** using extraction of **poles.**

$$s^3 + 4s^2 + 6s + 4 = 0$$

$$D(z) = z^3 + (-3\sigma + 4)z^2$$
$$+ (3\sigma^2 - 8\sigma + 6)z + (-\sigma^3 + 4\sigma^2 - 6\sigma + 4)$$

Real pole: $-\sigma^3 + 4\sigma^2 - 6\sigma + 4 = 0 \rightarrow \sigma = 2$

Imaginary poles: $(4 - 3\sigma) \times (3\sigma^2 - 8\sigma + 6)$

$-(4\sigma^2 - 6\sigma + 4 - \sigma^3) = 0 \rightarrow \sigma = 1$

-2.0000
-1.0000 - 1.0000i
-1.0000 + 1.0000i

Routh's Method

Determine if the **system** below has a **minimum** stability margin of **0.5.**

$$\boxed{s^3 + 3.5s^2 + 3.5s + 1 = 0}$$

$s = z - 0.5$

$D(z) = z^3 + 2z^2 + 0.75z + 0.0 = 0$

Necessary condition violated. Minimum

Stability margin is 0.5 as 1 pole is on $\pm j\omega$ axis.

-2.0000
-1.0000
-0.5000