

Example 2

So, at $K = 1$, the gain margin of

$$G(s) = \frac{\omega_n^2}{s^2 + 2\zeta\omega_n s} = \frac{\omega_n^2}{s(s + 2\zeta\omega_n)}$$

is equal to ∞ — what does that mean?

It means that we can keep on increasing K indefinitely without ever encountering instability.

But we already knew that: the characteristic polynomial is

$$p(s) = s^2 + 2\zeta\omega_n s + \omega_n^2,$$

which is *always stable*.

What about **phase margin**?