

Stability Conditions for Low-Order Polynomials

The upshot:

- ▶ A 2nd-degree polynomial $p(s) = s^2 + a_1s + a_2$ is stable if and only if $a_1 > 0$ and $a_2 > 0$
 - ▶ A 3rd-degree polynomial $p(s) = s^3 + a_1s^2 + a_2s + a_3$ is stable if and only if $a_1, a_2, a_3 > 0$ and $a_1a_2 > a_3$
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- ▶ These conditions were already obtained by Maxwell in 1868.
 - ▶ In both cases, the computations were *purely symbolic*: this can make a lot of difference in *design*, as opposed to *analysis*.