Application of Routh-Hurwitz Stability Criterion to Second-order Systems

The characteristic equation of a second-order system is given as follows:

$a\lambda^2+b\lambda+c$

The Routh-Hurwitz table for the system will be:

λ^2	a	c
λ	b	0
λ^0	$-\frac{\begin{vmatrix} a & c \\ b & 0 \end{vmatrix}}{b}=c$	

According to Routh-Hurwitz stability criterion, the system will be stable if the numbers in the second column of the table above are all positive. Therefore the coefficients *a, b*, and *c* have to be positive for stability.

You must have learned about Routh-Hurwitz stability in Control Systems (or classical control theory) in undergraduate school. Please use the following reference book to refresh your memory about Routh-Hurwitz stability.

Norman S. Nise, *Control Systems Engineering*, 7th Edition, 2015, John Wiley & Son, Inc.

The explanation above should help you with understanding the conclusion at the bottom of Slide 25 in Lecture 1.