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A LTI system is stable 
$$\iff \int_{-\infty}^{\infty} |h(t)| dt < \infty$$

For the finite duration system

$$\int_{\infty}^{\infty} |R(t)| dt = \int_{t_1}^{t_2} |R(t)| dt$$
$$\leq \int_{t_1}^{t_2} Ddt = D(t_2 - t_1) < \infty$$

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