# RESONANCE IN LINEAR DIFFERENTIAL EQUATIONS AND L'HOSPITAL'S RULE*

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Historically, differential equations grew into an independent subject from a branch of calculus. It is very useful to cultivate this connection in both calculus and differential equations courses, all the more that today's changes in calculus teaching will influence our approach to differential equations. From this standpoint, we would like to continue the discussion initiated in [1] on the application of L'Hospital's rule to the study of the solutions of linear differential equations with constant coefficients.

Consider the undamped mass-spring system with a given periodic external force. The equation of motion is

$$(1) \qquad\qquad x'' + \omega_0^2 x = A \cos \omega t,$$

where $\omega_0$ is the natural frequency of the system and $\omega$ is the applied