

Problem 32

Consider the differential equation

$$ay'' + by' + cy = 0,$$

where $b^2 - 4ac < 0$ and the characteristic equation has complex roots $\lambda \pm i\mu$. Substitute the functions

$$u(t) = e^{\lambda t} \cos \mu t \quad \text{and} \quad v(t) = e^{\lambda t} \sin \mu t$$

for y in the differential equation and thereby confirm that they are solutions.