

## ODE の例題 (力学演習 II 第 1 回: 前期の復習)

$$(A) \quad \frac{d^4\phi}{dt^4} + 20\frac{d^2\phi}{dt^2} + 64\phi = 12$$

$$(B) \quad \frac{d^2u}{dt^2} + 4\frac{du}{dt} + 5u = \cos(7t + \varphi)$$

$$(C) \quad \frac{du}{dr} = 3re^r$$

$$(D) \quad 21\frac{d^2\theta}{ds^2} - 25\frac{d\theta}{ds} - 4\theta = 0$$

$$(E) \quad \frac{d}{dt} \begin{bmatrix} p \\ q \end{bmatrix} = \begin{bmatrix} -10 & -2 \\ -14 & -22 \end{bmatrix} \begin{bmatrix} p \\ q \end{bmatrix}$$

$$(F) \quad \frac{d^2\psi}{dr^2} + 4\frac{d\psi}{dr} + 13\psi = 2\sin r$$

$$(G) \quad \frac{d}{dt} \begin{bmatrix} u \\ v \end{bmatrix} = \begin{bmatrix} 23 & 2 \\ 5 & 26 \end{bmatrix} \begin{bmatrix} u \\ v \end{bmatrix} + \begin{bmatrix} -40 \\ 68 \end{bmatrix}$$

$$(H) \quad 36\frac{d^2u}{dt^2} + 64u = 5\sinh 4t$$

$$(I) \quad 3\frac{d^2\psi}{dx^2} + 7\frac{d\psi}{dx} + 4\psi = 2e^{-6x}$$

$$(J) \quad t^2\frac{d^2p}{dt^2} + 15t\frac{dp}{dt} + 40p = t^{-1}$$

$$(K) \quad \frac{d}{dt} \begin{bmatrix} p \\ q \end{bmatrix} = \begin{bmatrix} 2 & -2 \\ 2 & 0 \end{bmatrix} \begin{bmatrix} p \\ q \end{bmatrix} + \begin{bmatrix} 2\cos t \\ 0 \end{bmatrix}$$

$$(L) \quad -2\frac{du}{dr} + u = 1, \quad u|_{r=0} = 3$$

$$(M) \quad \frac{du}{dt} = -u^2 + u, \quad u|_{t=-1} = -2$$

$$(N) \quad 2\frac{d^2\psi}{dx^2} + 4\frac{d\psi}{dx} + 2\psi = 2$$

$$(O) \quad 3\frac{du}{dr} + u = 2\sin r$$

$$(P) \quad t^2\frac{d^2y}{dt^2} + 11t\frac{dy}{dt} + 24y = 24$$

$$(Q) \quad 2\frac{d^2y}{dx^2} + 18y = -\cos^3 3x$$

$$(R) \quad \frac{d^3x}{dt^3} + \frac{d^2x}{dt^2} - \frac{dx}{dt} - x = -e^{-t}$$

$$(S) \quad \frac{d^3u}{ds^3} + 5\frac{d^2u}{ds^2} + 16\frac{du}{ds} + 30u = 0$$