

- (a) A mass m_1 , hanging at the end of a string, draws a mass m_2 along the surface of a smooth table. If the mass on the table be doubled, the tension of the string is increased by one-half. Show that $m_1 : m_2 = 2 : 1$. 13

- (b) Solve the initial value problem

$$\frac{dy}{dx} = \frac{y-x}{y+x}, \quad y(0) = 1$$

for $x = 0.1$ by Euler's method. 13

- (c) Show that the vorticity vector $\vec{\Omega}$ of an incompressible viscous fluid moving under no external forces satisfies the differential equation

$$\frac{D\vec{\Omega}}{Dt} = (\vec{\Omega} \cdot \nabla) \vec{v} + \nu \nabla^2 \vec{\Omega}$$

where ν is the kinematic viscosity. 14
