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MA601 tutorial 9, 2019

1. Solve partial differential equation in one variable: $\frac{\partial^2 u}{\partial x^2} + 16\pi^2 u = 0$.

2. $$\text{Solve} \qquad \frac{\partial^2 u}{\partial t^2} = \frac{\partial^2 u}{\partial x^2},\ 0 < x < 1,\ u_x(0,t) = u_x(1,t) = 0,\ \text{with } u(x,0) = x.$$

3. Solve
$$\frac{\partial u}{\partial t} = 9\frac{\partial^2 u}{\partial x^2},\ -\infty < x < \infty,\ t > 0,\ u(x,0) = xe^{-x}.$$

4. Solve the wave equation
$$\frac{\partial^2 u}{\partial x^2} = \frac{\partial^2 u}{\partial t^2},\ 0 < x < 1,\ u(0,t) = 0 = u(1,t),$$
with initial conditions $u(x,0) = \sin(\pi x) - 0.5\sin(2\pi x),\ u_t(x,0) = 0$.

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