1. Formally Solve IVP/BVP for Heat Equation:

$$PDE: \frac{\partial u}{\partial t} = 3^2 \times \frac{\partial^2 u}{\partial x^2}, \quad 0 < x < \pi/2, \quad t > 0;$$

$$BCs: \quad u(0, t) = 0 = u(\pi/2, t), \quad t > 0;$$

$$IC: \quad u(x, 0) = 10 \times \sin(2x) - 0.1 \times \sin(4x)$$

$$+ 0.001 \times \sin(8x), \quad 0 < x < \pi/2;$$


*Fourier Sine Coefficient for $f(x)$ on $0 < x < L$ (if needed):*

$$FSC: \quad b_n = \frac{2}{L} \int_0^L f(x) \sin \left( \frac{n\pi x}{L} \right) \, dx;$$