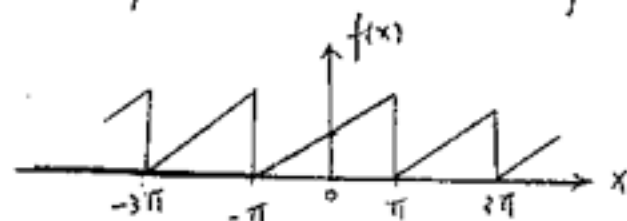


1.) (20分) Find the solution of the following equation by using the method of Variation of Parameters.

$$y'''(x) - 3y''(x) + 3y'(x) - y(x) = \frac{e^x}{x}$$

2.) (17分) Find the Fourier Series of the Saw tooth wave function:

$$f(x) = x + \pi \text{ if } -\pi < x < \pi \text{ and } f(x+2\pi) = f(x)$$



3.) (13分) Find a minimum order operator L to annihilate y (i.e., $Ly = 0$), where $y(x) = \cos 2x + x^3 e^{2x} + x + 1 + \sin 4x + \sin 9x$

(20分) (4.) Expand $f(z) = \frac{1}{(z-1)(z-2)}$

(a) for $|z| < 1$

(b) for $1 < |z| < 2$

(c) for $2 < |z|$

(20分) (5.) Solve the following boundary-value problem

$$\begin{cases} \frac{\partial^2 u}{\partial x^2} = a^2 \frac{\partial u}{\partial t}, & 0 \leq x \leq l, \quad t \geq 0, \\ & a: \text{constant} \\ u(0, t) = 0 \\ u(l, t) = 100 \\ u(x, 0) = 100 \end{cases}$$

(10分) (6.) Evaluate $\int_0^{\infty} \frac{x^{a-1}}{1+x^2} dx, \quad 0 < a < 2$