(1) Find a general solution of $x^2y'' - xy' + y = 0$ $y(1) = 1.5$ $y'(1) = 0.25$ (20 points)
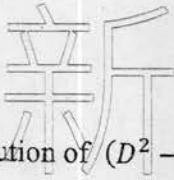
(2) Find a general solution of $(D^2 - 2D + 1)y = 35x^{3/2}e^x$ (20 points)

(3) Find a general solution of $(x^2 + y^2)dx = 2xydy$ (20 points)

(4) Represent f(x) as a Fourier integral, $f(x) = \begin{cases} \sin x, & if\ 0 < x < \pi \\ 0, & if\ x > \pi \end{cases}$
(20 points)

(5) Find the Fourier cosine series and Fourier sine series of f(x), where $f(x) = \sin x$, $0 < x < \pi$ (20 points)