淡江大學 99 學年度進修學士班轉學生招生考試試題

系別：電機工程學系三年級　　科目：工　程　數　學

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1. (15%) Assuming that $y = x^m$ is a solution of the equation: $x^2y'' - 7xy' + 15y = 0$, please find the values of m ! (note, you need to show your derivations to get full credits.)

2. (15%) For the differential equation $y' = y^2 + 2y - 3$, please determine the constant solutions !

3. (20%) Solve the differential equation $4y'' - 4y' - 3y = \cos 2x$ by undetermined coefficients method !

4. (20%) Find the inverse Laplace transform of the following function :

$$F(s) = \frac{s}{(s+2)(s^2+2)}$$

5. (20%) For the following function :

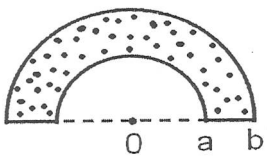
$$f(x) = x|x|$$

(a) Is it an even or odd function?

(b) Find the Fourier series expansion of $f(x)$ on $[1,1]$.

6. (10%) (a) For the surface integral $\iint f(r,\phi) r dr d\phi$ that integrates on the dotted area,

please **write down** the upper and lower bounds with respect to r and ϕ, respectively. (you don't need to prove or carry out the integration)



(b) For the surface integral through the cylindrical coordinates, please draw the shape of the corresponding surface area of the integral according to the upper and lower bounds.

$$\int_0^{\pi/2} \int_{-3}^{3} f(r,\phi) r dz d\phi$$