

# 長庚大學108學年度研究所碩士班招生考試試題

系所：電子工程學系碩士班

考試科目：工程數學

注意：請詳細閱讀下列試題，並請標明題號依試題順序將答案書寫於答案卷上。 本試題共 | 頁：第 | 頁

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1. (10%) Find the general solution of the differential equation  $\frac{dy}{dx} + 2xy = 0$
2. (10%) Find the general solution of  $4y'' - 12y' + 9y = 0$
3. (10%) Find the particular solution of  $y'' + 16y = e^{3x}$
4. (10%) Find the Laplace transform of
  - (a)  $f(t) = 3e^{2t}$
  - (b)  $f(t) = 2\sin^2 3t$
5. (10%) Find the inverse Laplace transform of  $\frac{s^2 + 1}{s^3 - 2s^2 - 8s}$
6. (10%) Determine whether the first vector is a linear combination of the other vectors  
(6, 13, 9); (1, 1, 1) (1, 2, 4) (0, 1, -3)
7. (10%) If  $A = \begin{bmatrix} 1 & -2 \\ -1 & 0 \end{bmatrix}$ , compute  $A^4$ .
8. (5%, 5%) Find the (a) norms and (b) normalized vectors of the vector (2, -1, 3).
9. (10%) Define a function  $f(z) = z^2 - (2+i)z$  Please find  $f(1+i)$
10. (10%) Define a complex number  $z = -\sqrt{3} - i$  Please find the polar form.