

# 大同大學 103 學年度研究所碩士班入學考試試題

考試科目：工程數學

所別：通訊工程研究所 甲組

第 全 頁

註：本次考試 不可以參考自己的書籍及筆記； 不可以使用字典； 不可以使用計算器。

1. (30 points) Find the values of  $a$  and  $b$  for which the following system has (i) no solution, (ii) a unique solution, (iii) infinitely many solutions?

$$x + 2y - 3z = 4$$

$$2x + 3y - az = 5$$

$$3x + 4y - 5z = b$$

2. (20 points) Find the eigenvalues and the corresponding eigenvectors of  $A = \begin{bmatrix} 3 & -2 \\ 5 & -4 \end{bmatrix}$ .
3. (30 points) Customers arrive in a certain shop according to a Poisson process at a mean rate of 20 per hour. What is the distribution of the waiting time until the first arrival? What is the probability that the waiting time until the first arrival is more than 6 minutes?
4. (20 points) Let random variable  $X$  has the density function  $f(x) = x^2/3$ ,  $-1 < x < 2$ . Find the density function of the random variable  $Y = X^2$ .