

大同大學 95 學年度研究所碩士班入學考試題

考試科目：工程數學

所別：通訊工程研究所

第1頁 共1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. [20 points] For which values of c does the following system have a unique solution?

$$\begin{aligned}x + z - w &= 2 \\y - 2z &= 33 \\x + cz &= 444 \\z - w &= 5555\end{aligned}$$

2. [20 points] Find the eigenvalues and eigenvectors for the following matrix.

$$\begin{bmatrix} a^2 - b^2 & -2ab \\ -2ab & -a^2 + b^2 \end{bmatrix}$$

3. [15 points] A non-negative random variable T is characterized by a distribution function $F(t)$ and a density function $f(t)$. Show that the following equation is valid.

$$\int_0^{\infty} t^i \cdot f(t) dt = \int_0^{\infty} i t^{i-1} \cdot (1 - F(t)) dt$$

4. [15 points] Suppose $F(t)$ is the life-time distribution function. Given that a certain age x has already been obtained, we wish to find the distribution of the remaining life time. Express the conditional distribution function $F(t+x|x)$ in term of $F(t)$.
5. [15 points] Find the fourier transform of $f(t)$ where $f(t) = 1 + \cos(\pi t)$ when $|t| \leq 1$ and $f(t)$ is 0 elsewhere.
6. [15 points] If $f(t) = tg(t)$, find the relationship between the fourier transforms of $f(t)$ and $g(t)$.