

淡江大學九十三年學年度碩士班招生考試試題

系別：資訊工程學系

科目：數學(含離散數學、線性代數)

准帶項目請打「○」否則打「x」
簡單型計算機
X

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1. How many times is the printf statement executed for the following program segment?

```

for ( i = 1; i <= 24; i++)
  for ( j = i; j <= 24; j++)
    for ( k = j; k <= 24; k++)
      for ( m = k; m <= 24; m++)
        printf("i + j + k + m = %d\n", i+j+k+m);
  
```

(25%)

2. How many four-element subsets of $S = \{1, 2, 3, \dots, 13\}$ contain no consecutive integers.

(25%)

3. Find eigenvalues for the following matrix and, for each eigenvalue, find corresponding eigenvector. Also, find an orthogonal matrix that diagonalizes the matrix.

$$\begin{pmatrix} 5 & 0 & 0 & 0 \\ 0 & 0 & -1 & 0 \\ 0 & -1 & 0 & 0 \\ 0 & 0 & 0 & 0 \end{pmatrix} \quad (25\%)$$

4. Use the principal axis theorem to analyze the following conic equation.

$$6x_1^2 + 2x_1x_2 + 5x_2^2 = 9 \quad (25\%)$$