

淡江大學八十九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)

本試題共 / 頁

1. Let W be the plane with equation $2x + y - 3z = 0$.
- (a). Find a basis for W .
 - (b). Find the standard matrix $[P] = A(A^T A)^{-1} A^T$ for the orthogonal projection on W .
 - (c). Use your answer to part (b) to find the distance between point $(0, 4, -1)$ and W .
- (25%)

2. Let $x = (\frac{1}{\sqrt{8}}, \frac{1}{\sqrt{8}})$, $y = (\frac{1}{2}, \frac{-1}{4})$. Using the inner product $\langle u, v \rangle = 3u_1v_1 + 5u_2v_2$ ($u = (u_1, u_2)$ and $v = (v_1, v_2)$), determine whether the set $\{x, y\}$ is orthonormal, orthogonal only, normal only, or neither.
- (25%)

3. Show that $x^2 + 4x + 17$ is $O(x^3)$ but that x^3 is not $O(x^2 + 4x + 17)$.
- (25%)

4. (a). Find the language recognized by the given nondeterministic finite-state automaton.
 (b). Find a deterministic finite-state automaton that recognizes the same language. (25%)

