編號： 200

國立成功大學 105 學年度碩士班招生考試試題

系　　所：製造資訊與系統研究所

考試科目：工程數學

考試日期：0227，節次：2

※ 考生請注意：本試題不可使用計算機。　請於答案卷(卡)作答，於本試題紙上作答者，不予計分。

1. Find the angle between vectors **a** = 2**i** + 3**j** + **k** and **b** = -**i** + 5**j** + **k**? (20%)
   (Hint: For the answer, you just write, for example, $\theta = \tan^{-1}(x/y)$. You don't need to solve x/y value. "tan" is just an example, it can be sin, cos, or tan.)

2. Find an equation of the plane with normal vector **n** = 2**i** + 8**j** – 5**k** containing the point (4, -1, 3)? (20%)

3. Given following equations:

$$2x_1 - 9x_2 = 15$$
$$3x_1 + 6x_2 = 16.$$

   1) Please write them to be the format as Ax=b, where A is a 2x2 matrix, x is a 2x1 vector and b is also a 2x1 vector. (10%)
   2) Please solve unknown x vector? (10%)

4. Find the eigenvalues and eigenvectors of **A** = $\begin{pmatrix} 3 & 4 \\ -1 & 7 \end{pmatrix}$? (20%)

5. Convert $(-\sqrt{2},\ \sqrt{2},\ 1)$ in (x,y,z) rectangular coordinates to cylindrical coordinates (r, θ, z) ? (20%)