

Taylor's College Subang Jaya
Cambridge A Levels
Further Mathematics P1 Test No. 02

Duration : **50 minutes**

Setter : **Chin K. F., Kev**

Answer all questions.

1. Solve the system of linear equations $\begin{cases} x + ky = k \\ kx + y = k \end{cases}$ completely for x and y . [4]

2. The plane π has equation $\mathbf{r} = 2\mathbf{i} + 3\mathbf{j} - \mathbf{k} + \lambda(\mathbf{i} - 2\mathbf{j} + 2\mathbf{k}) + \mu(3\mathbf{i} + \mathbf{j} - 2\mathbf{k})$. The line l , which does not lie in π , has equation $\mathbf{r} = 3\mathbf{i} + 6\mathbf{j} + 12\mathbf{k} + t(8\mathbf{i} + 5\mathbf{j} - 8\mathbf{k})$.

(i) Show that l is parallel to π . [4]

(ii) Find the position vector of the point at which the line with equation $\mathbf{r} = 5\mathbf{i} - 4\mathbf{j} + 7\mathbf{k} + s(2\mathbf{i} - \mathbf{j} + \mathbf{k})$ meets π . [4]

(iii) Find the perpendicular distance from the point with position vector $9\mathbf{i} + 11\mathbf{j} + 2\mathbf{k}$ to l . [4]

3. The roots of the equation $x^4 - 3x^2 + 5x - 2 = 0$ are α , β , γ , δ , and $\alpha^n + \beta^n + \gamma^n + \delta^n$ is denoted by S_n .

Show that $S_{n+4} - 3S_{n+2} + 5S_{n+1} - 2S_n = 0$ [2]

Find the values of

(i) S_2 and S_4 , [3]

(ii) S_3 and S_5 . [6]

Hence, find the value of

$$\alpha^2(\beta^3 + \gamma^3 + \delta^3) + \beta^2(\gamma^3 + \delta^3 + \alpha^3) + \gamma^2(\delta^3 + \alpha^3 + \beta^3) + \delta^2(\alpha^3 + \beta^3 + \gamma^3). \quad [3]$$