Task 1

if $u = \lambda v$, $\exists\ \lambda \in R$, u and v are parallel.

let $(-2\lambda, 1\lambda, 3\lambda) = (4, 6, 1)$

$$\begin{cases} -2\lambda = 4 \\ \lambda = 6 \\ 3\lambda = 1 \end{cases}$$

不存在任一實數λ符合等式，$(-2,1,3)$與$(4,6,1)$不為 parallel.

$\lambda(1,2) = (-3,-6)$，$\lambda = -3$，得$(1,2)$與$(-3,-6)$ parallel

Ans: (1,2) and (-3, -6) ((0,0,2,-4,-8) and (5, 0, 1, -2, 4)

~~Task2:~~ ~~① $u = (0,4,6) - (2,-5,-1) = (-2,9,7)$~~

~~$v = (0,4,6) - (-3,7,1) = (3,-3,5)$~~

~~plane equations: $x = (0,4,6) + s(-2,9,7) + t(3,-3,5)$~~

~~② $u = (1,$~~

Task 2

① let $a = (2, -5, -1)$

$u = (0, 4, 6) - (2, -5, -1) = (-2, 9, 7)$

$v = (-3, 7, 1) - (2, -5, -1) = (-5, 12, 2)$

plane equation $x = (2, -5, -1) + s(-2, 9, 7) + t(-5, 12, 2)$

② let $a = (1, 2, 1)$

$u = (2, 4, 2) - (1, 2, 1) = (1, 2, 1)$

$v = (-3, -6, -3) - (1, 2, 1) = (-4, -8, -4)$

$x = (1, 2, 1) + s(1, 2, 1) + t(-4, -8, -4)$

$= (1, 2, 1) + s(1, 2, 1) + -4t(1, 2, 1)$

$= (1 + s - 4t)(1, 2, 1)$

let $(1 + s - 4t) = \lambda$, $x = \lambda(1, 2, 1)$

x為直線

③ let $a = (0, 0, 0)$

$u = (1, 1, 1) - (0, 0, 0) = (1, 1, 1)$

$v = (2, 5, 2) - (0, 0, 0) = (2, 5, 2)$

plane equation $x = (0, 0, 0) + s(1, 1, 1) + t(2, 5, 2)$

$= s(1, 1, 1) + t(2, 5, 2)$

Task 3

① $M_{2\times5} + O = M_{2\times5}$

$M_{2\times5} + O - M_{2\times5} = M_{2\times5} - M_{2\times5}$

$O + M_{2\times5} - M_{2\times5} = M_{2\times5} - M_{2\times5}$

$O = M_{2\times5} - M_{2\times5} = \begin{bmatrix} 0&0&0&0&0 \\ 0&0&0&0&0 \end{bmatrix}$

②

$P(F) = \{ a_n x^n + a_{n-1} x^{n-1} + \cdots + a_1 x + a_0 \mid a_i \in F \}$

$f(x) = 3.2x^2 + 2x - 0.5$

$3.2 \notin N \quad -0.5 \notin N$

$f(x) \notin P(N)$

Task 4

① False

counterexample :

$f(x) = ax^1 + b, \quad g(x) = -ax^1 + b$

$f(x) + g(x) = 2b$

② True

③ False

let $x = (a_1, b_1), \ y = (a_2, b_2), \ x \neq y$

$a = 0$

$ax = ay = (0, 0)$