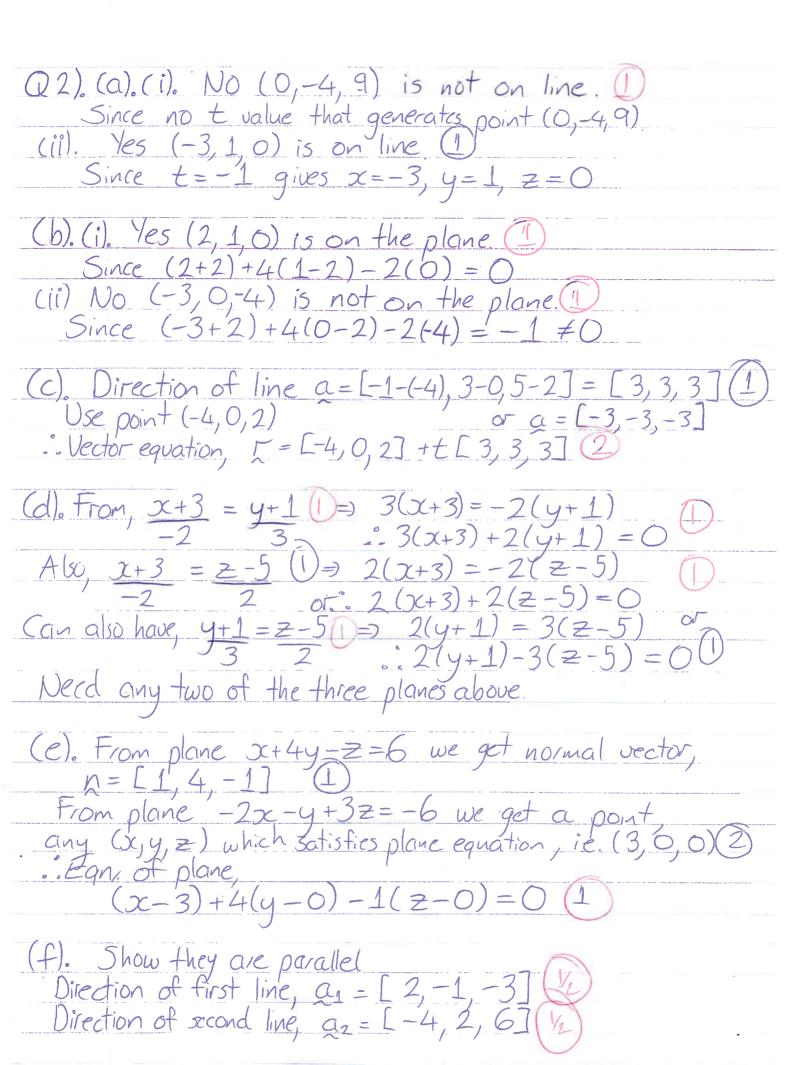
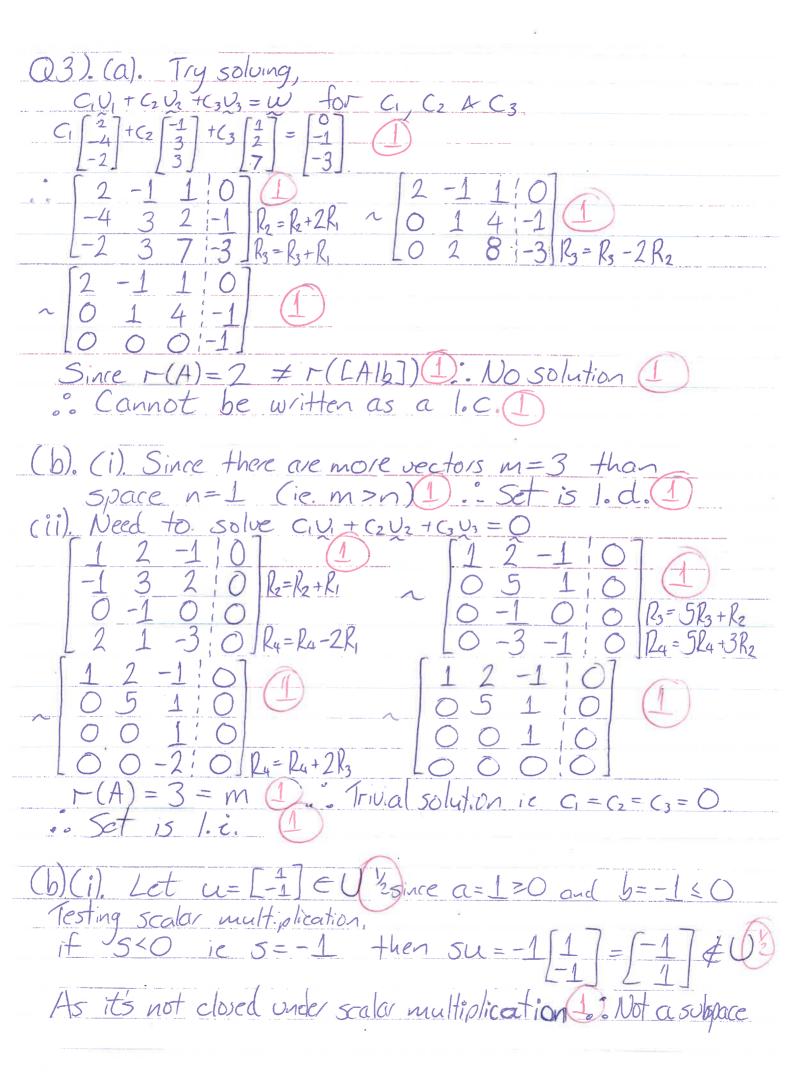
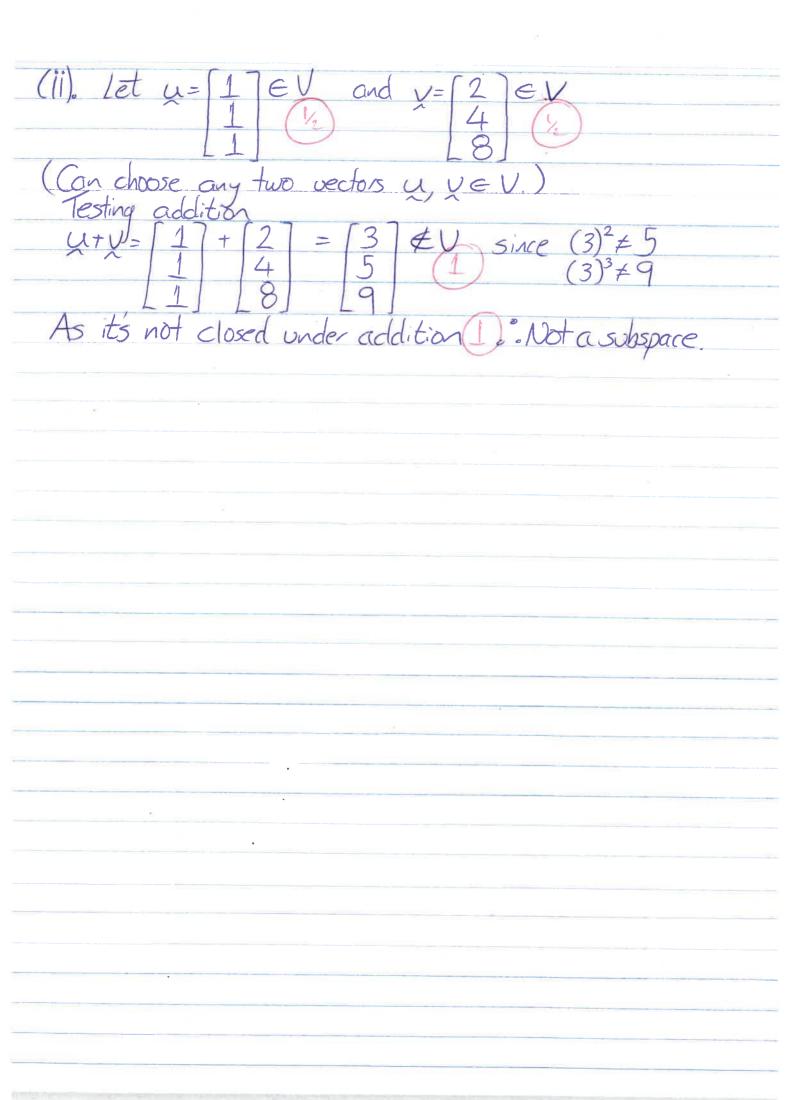
01). (a). 
$$\overrightarrow{AB} = [2-(1), 0-1, 3-2, 3-4] = [3, -1-5, -1]$$
 Dist =  $||AB|| = J(3)^{2} \cdot (-1)^{2} + (-5)^{2} \cdot (-1)^{2} = J(3) = 6$  (b).  $a.b = [2, -1, 4]. [3, 5, -1] = 6 - 5 - 4(1) = -3 (1)$  (c).  $0 = \cos^{-1}\left(\frac{[3, 1, 1, -1]. [2, 0, -4, 1]}{J(3^{2}+1^{2}+1^{2}+1^{2}+0^{2}+(4)^{2}+1^{2}}\right) = \cos^{-1}\left(\frac{6+0-4-1}{J(4+1+1+1)J(4+0+16+1)}\right) = \cos^{-1}\left(\frac{1}{J(2)J(2)}\right) \approx 86.39^{\circ}$  (d).  $0 = e = [3, 2-1] = [3, 2] = [3, 2] = [3, 2] = [3]$ 



Since a1=maz (ie.m=-12) :- parallel. Also need to show they share a common point Point on second line (x, y, z) = (-10, 8, 15).

Substituting this point into first line,  $-10 = -4 + 2t \implies -6 = 2t \implies t = -3$   $8 = 5 - t \implies 3 = -t \implies t = -3$   $15 = 6 - 3t \implies 9 = -3t \implies t = -3$ Hence for t=-3 we also get the point (-10, 8, 15/2). Describe same line, since parallel with common point (1





```
A|0| = |1|3|1
                         -2 1 -2 0 0 | R_2 = R_2 + 2R
-1 4 -1 -2 0 | R_3 = R_3 + R_1
                                        -4:0
R_3 = R_3 - R_2
R_3 = R_3 - R_2
   r(A) = 2 = 1 ... Need n-r = 4-2=2 parameters!
  Let X3=5(1/2) x4=t (1/2
 low 2: 7x_2 - 4x_4 = 0 \Rightarrow 7x_2 = 4t ... x_2 = 4\frac{t}{3} (1 + 3x_2 + x_3 - 2x_4 = 0 \Rightarrow x_1 + 3(4t_2) + 5 - 2t = 0

... x_1 = 2\frac{t}{3} - 5
(b), 10 2 0 0 1
  Cotaclor exp along 2nd row = -2 \begin{bmatrix} -2 & | 4 & -2 & 0 \\ | 6 & 0 & -2 \\ | 0 & | 3 & 0 \end{bmatrix}
                                          Cofactor exp. along 3rd row

1 6 0 + 2 0 + 7

-3 0 2 1
                                          Cofactor expalong 1st row
   Cotactor exp along 3rd row
   =4[-3|40|7/2+6[-(-2)]-3
6|-2|7/2+6[-(-2)]-3
    = -12(-8-0)/2 + 12(-6-0)/2
= 96-72
     = 24 (1)
```

(c). 
$$A = \begin{bmatrix} 1 & -1 & 3 \\ 2 & 1 & 2 \\ -1 & 3 & 1 \end{bmatrix}$$

Cofactor expansion along 1st row 
$$det(A) = 1 | 1 | 2 | -(-1) | 2 | 2 | + 3 | 2 | 1 | 1 | 3 | 1 | -1 | 1 | 1 | -1 | 3 | 1 | = 1(1-6) + 1(2-(-2)) + 3(6-(-1))(2) = 1(-5) + 1(4) + 3(7) = 20(12)$$

$$A_{1} = \begin{bmatrix} -6 & -1 & 3 \\ 2 & 1 & 2 \\ 2 & 3 & 1 \end{bmatrix}$$

Cofactor expansion along 1st row 
$$\det(A_1) = -6 \begin{vmatrix} 1 & 2 \end{vmatrix} - (-1) \begin{vmatrix} 2 & 2 \end{vmatrix} + 3 \begin{vmatrix} 2 & 1 \end{vmatrix} \begin{vmatrix} 1 & 2 & 3 \end{vmatrix}$$

$$= -6(1-6) + 1(2-4) + 3(6-2) \begin{pmatrix} 1 & 2 & 3 \end{vmatrix}$$

$$= -6(-5) + 1(-2) + 3(4)$$

$$= 40 \begin{pmatrix} 1 & 2 & 3 \\ 2 & 3 & 4 \end{pmatrix}$$

$$\therefore x_1 = \det(A_1) = 40 = 21$$

$$\begin{bmatrix} A^{T}A & A^{T}b \end{bmatrix} = \begin{bmatrix} 5 & 0 & 10 & 0 & | & 1 \\ 0 & 10 & 0 & 34 & | & 2 \\ 10 & 0 & 34 & 0 & | & 4 \\ 0 & 34 & 0 & | & 30 & | & -4 \end{bmatrix} \begin{pmatrix} 1 & 1 & 1 \\ 2 & 1 & 1 & 1 \\ 4 & 1 & 1 & 1 \end{pmatrix}$$

Pau4: 
$$144a_3 = -108$$
 =)  $a_3 = -108_{144} = -34_{1}$   
Row3:  $14a_2 = 2$  =)  $a_2 = \frac{3}{4} = \frac{1}{7}$  (1)  
Row2:  $10a_1 + 34a_3 = 2$  =)  $10a_1 + 34(-34_1) = 2$   
=>  $10a_1 = \frac{55}{2}$  =>  $a_1 = \frac{11}{4}$   
Row1:  $5a_0 + 10a_2 = 1$  =)  $5a_0 + 10(\frac{1}{3}) = 1$   
=>  $5a_0 = -37_{1}$  =)  $a_0 = -33_{35}$  (1)