Answer 4(a)

Given,
f(x) is a polynomial of degree 4.

∴ There will be four results.

As one zero is real and another is complex, so the rest two zeros of the polynomials ~~is~~ are real and ~~in~~ complex. So in remaining zeros, one zero will be real number.

As complex roots always stay in pair with their conjugate, so one of the zero will be $4+2i$. (Ans).

Answer 1 (b)

The given equations,

$$x + 4y - 3z = 1$$

$$3x - y + 3z = 1$$

$$10x + y + 6z = -2$$

The determinants of the given equations

$$D = \begin{vmatrix} 1 & 4 & -3 \\ 3 & -1 & 3 \\ 10 & 1 & 6 \end{vmatrix}$$

$$= 1(-6-3) - 4(18-30) - 3(3+10)$$

$$= -9 + 48 - 39$$

$$= 0$$

So we see that the denominator ~~determinants~~ of the given three equations are zero. So the statement of my friend is correct. The statement of of matrix whose determinants are zero does ~~not~~ not have solution. (showed).

Answer 2(b)

Let, $A.C = BC$

or, $A = BCC^{-1}$

or, $A = BI$

$A = B$

So, Yes $A = B$ is valid if C is a inversible matrix because $AC = BC$ then,

$$A = BC \times C^{(-1)} = BI = B$$

Answer 2(a)

Given, $u = 2i - 3j + k$

$v = -3i + 3j + 2k$

Now, $\vec{u} \times \vec{v} = \begin{vmatrix} \hat{i} & \hat{j} & k \\ 2 & -3 & 1 \\ -3 & +3 & 2 \end{vmatrix}$

$= i(-6-3) - j(4+3) + k(6-9)$

~~$= -9\hat{i}$~~

$= -9i - 7j - 3k$

$\vec{u} \times \vec{v} = \langle -9, -7, -3 \rangle$

Now, $\| u \times v \| = \sqrt{(-9)^2 + (-7)^2 + (-3)^2}$

$= \sqrt{139}$

Let the two orthogonals be u_1 and u_2.

Now,

$u_1 = \dfrac{\vec{u} \times \vec{v}}{\| u \times v \|} = \dfrac{1}{\sqrt{139}} \langle -9, -7, -3 \rangle$ (Ans)

$u_2 = \dfrac{-\vec{u}_1 \times \vec{v}_1}{\| u \times v \|} = -\dfrac{1}{\sqrt{139}} \langle -9, -7, -3 \rangle$ (Ans)