Quiz #3 : Methods of Elimination

<u>Question 1</u>

Solve the system of equations using the method of elimination and select the correct answer.

$\{x+y=4, -6x+2y=16$

a):- x=0,y=0

b):- The system has no solution

c):- The system has infinitely many solutions.

d):- x=-1,y=5

e):- x=1,y=3

Answer:- d

<u>Question 2</u>

For the questions 2-3, calculate the determinant of the matrices and determine if the matrices are singular or non-singular:
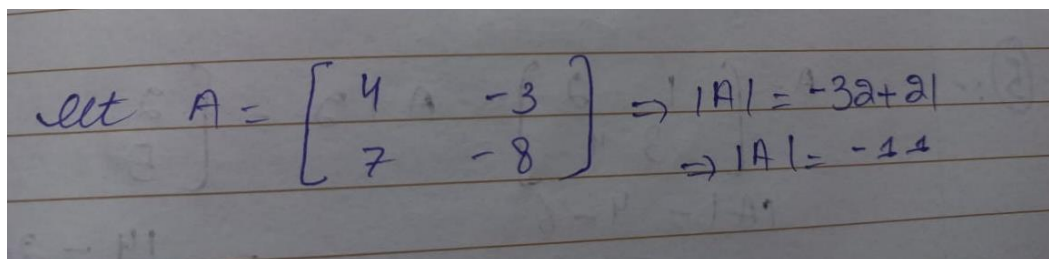
$$\begin{bmatrix} 4 & -3 \\ 7 & -8 \end{bmatrix}$$

a):- -11, singular

b):- -53, Non-singular

c):- -53, singular

d):- -11, Non-singular

Answer:- d

c):-

Question 3

$$\begin{matrix} -3 & 8 & 1 \\ 2 & 2 & -1 \\ -5 & 6 & 2 \end{matrix}$$

a):- 36, Non-singular

b):- -80, Non-singular

c):- -20, Non-singular

d):- 0, Non-singular

e):- 0, singular

Answer:- e

Question 4

Question 4

Determine if the provided matrix has linearly dependent or independent rows (a, b, c, d, e, f are any real numbers):

$$\begin{matrix} a & b & c \\ d & e & f \\ 2a-d & 2b-e & 2c-f \end{matrix}$$

Hint: Can one row in the matrix be obtained as a result of operations on the other rows?

a):- It can't be determined

b):- independent

c):- dependent

Answer:- c

Question 5

Which of the following operations, when applied to the rows of the matrix, do not change the singularity (or non-singularity) of the matrix:

a):- Adding a row to another one

b):- Adding a nonzero fixed value to every entry of the row

c):- Multiplying a row by a nonzero scalar

d):- Switching rows

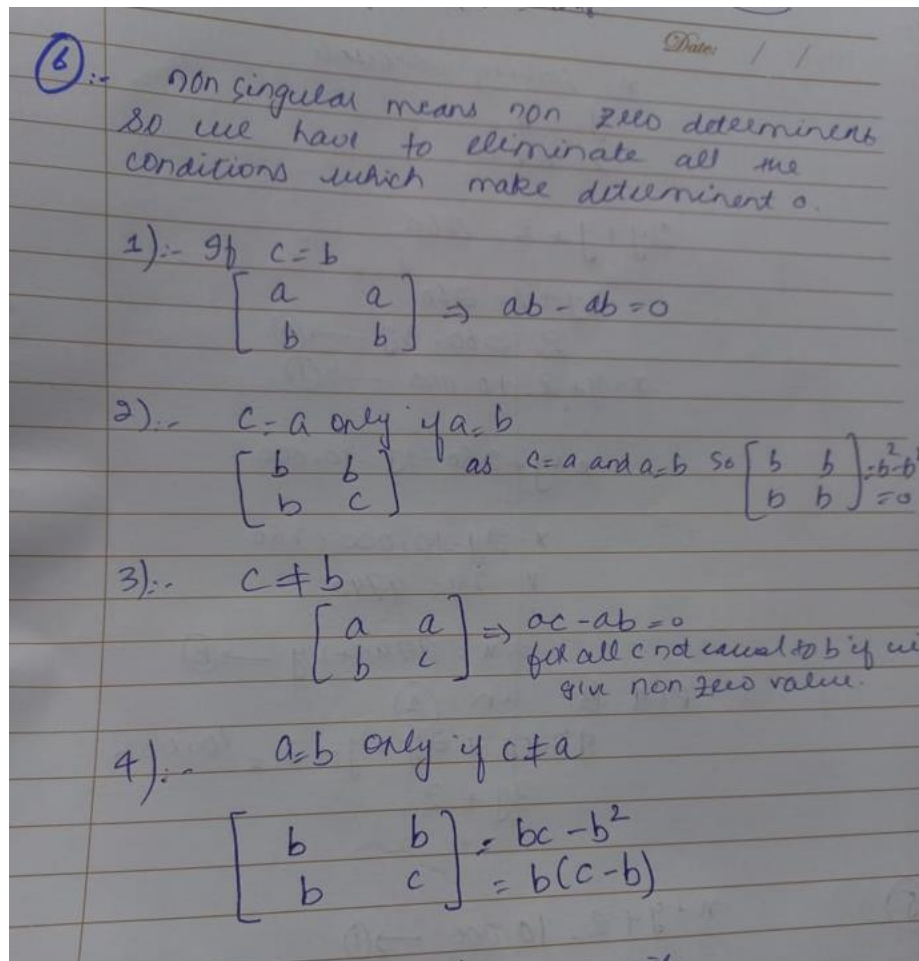**Answer:- a,c and d**

Question 6

In the following matrix:

$$\begin{bmatrix} a & a \\ b & c \end{bmatrix}$$

a, b, and c are non-zero real numbers. If the matrix is non-singular, which of the following must be true:

a):- c=b

b):- a = b only if c ≠ a

c):- c ≠ b

d):- c = a only if a = b

 Answer:- c

(6):- non singular means non zero determinant so we have to eliminate all the conditions which make determinant 0.

1):- If $c = b$

$$\begin{bmatrix} a & a \\ b & b \end{bmatrix} \Rightarrow ab - ab = 0$$

2):- $c = a$ only if $a = b$

$$\begin{bmatrix} b & b \\ b & c \end{bmatrix}$$ as $c = a$ and $a = b$ so $\begin{bmatrix} b & b \\ b & b \end{bmatrix} = b^2 - b^2 = 0$

3):- $c \neq b$

$$\begin{bmatrix} a & a \\ b & c \end{bmatrix} \Rightarrow ac - ab = 0$$ for all c not equal to b if we give non zero value.

4):- $a = b$ only if $c \neq a$

$$\begin{bmatrix} b & b \\ b & c \end{bmatrix} = bc - b^2 = b(c - b)$$

Question 7

Luis went yesterday to the bank to find out the interest rate of three different financial instruments. He received the following information:

Financial instrument	Savings account	Certificate of Deposit (CD)	Bonds
Annual interest	2%	3%	4%

He wants to invest his USD $10,000 savings in these three accounts. By doing so, he knows that after a year he would receive a total of US $ 260 in interest if he put twice as much money in the savings account as in the CDs, and "z" money in bonds.

Calculate the value of "z" , in USD, using the elimination method explained in the lectures.

a):- z=USD $1600

b):- it can't be determined

c):- z=USD $5600

d):- z=USD $2800

 Answer:- a

He needs to invest US $1.600 in bonds, US $5.600 in the savings account and US $2.800 in CDs.