1 . *In tossing a coin* 10 *times simultaneously. Find the probability of getting*
i) at least 7 *heads ii) almost* 3 *heads iii) exactly* 6 *heads.*

2. *In* 256 *sets of* 12 *tosses of a coin , in how many cases one can expect* 8 *Heads and* 4 *Tails.*

3. *Let* $V = \left\{ \begin{pmatrix} a & b \\ c & d \end{pmatrix} : a, b, c, d \in \mathbb{R} \right\}$ *set of all* 2 *X* 2 *matrices. Show that* V *is a vector space over* $\mathbb{R}$ *under usual matrix addition and real number multiplication with matrix.*

4. *Show that all* 2 *X* 2 *diagonal matrices are subspace of the above vector spaces.*

5. *Show that following vectors are linerly independent* (1,2,3), (3,1,7) & (2,5,8).

6. *Show whether the following function is Linear Transformation or not*
$T : \mathbb{R}^2 \to \mathbb{R}^2$ *such that* $T(x, y) = (3x + 5, 6y + 1)$ *over* $\mathbb{R}$.

7. *Define Linearly Dependent vectors .*
Show that zero vector of any vector space is always a Linearly dependent vector.
Suppose V *be a vector space over* $\mathbb{R}$. *Then find two subspaces of* V *over* $\mathbb{R}$

8. *Find the rank of the matrix* $\begin{pmatrix} 1 & 2 & -1 & 3 \\ 2 & 2 & 4 & 1 \\ 5 & 6 & 7 & 5 \end{pmatrix}$

9. *Find whether the given vectors are Linearly Independent or not.*
(1,2, −1,3), (2, −1,3,2), & (−1,8, −9,5).

10. $\begin{pmatrix} 1 & 2 & -1 & 3 \\ 0 & 0 & .5 & 1 \\ 1 & 0 & 0 & 0 \end{pmatrix}$ *is a row reduced matrix.*

The statement is true or false. give reason.

11. *Solve the following sytem of linear equations*
i. $x + y + z = 6, \quad x + 2y - 3z = -4, \quad -x - 4y + 9z = 18$
ii) $x + 2y - z = 3, 3x - y + 2z = 1, 2x - 2y + 3z = 2, x - y + z = -1$

12. *Determine the value of* λ *for which the following sytem of linera equations has non trivial solution* $3x + y - \lambda = 0, 4x - 2y - 3z = 0, 2\lambda x + 4y + \lambda z = 0.$

13. *Let* $A = \begin{pmatrix} 2 & -1 & 1 \\ -1 & 2 & -1 \\ 1 & -1 & 2 \end{pmatrix}$
a. Find the characteristic equation of A.
b. Show that the A satisfies characteristic equation.
c. Diagonalize the marix A

14. *Let* $A = \begin{pmatrix} 3 & 5 & 3 \\ 0 & 4 & 6 \\ 0 & 0 & 1 \end{pmatrix}$ *, Find all the eigen values and corresponding eigen vectors.*

15. *Find the nature, rank and signature of the quadratic form of*
$3x^2 + 5y^2 + 3z^2 - 2xy + 2xz - 2yz$