Assignment 1

1. Find the dot product of (2,3,1) and (5,3,1).
2. Find the cross product of (2,3,1) and (5,3,1).
3. Find the angle between (2,3,1) and (5,3,1).
4. Find the resultant vector produced by (2,3,1) and (5,3,1).
5. Find the direction of the resultant vector produced by (2,3,1) and (5,3,1).
6. Find the magnitude of (2,3,1).
7. Find the direction of (2,3,1).
8. Find the direction of the cross product of (2,3,1) and (5,3,1).
9. Consider two vectors a = (10, 3, 8) and b = (4, 6, 1). What is a+b?
10. Consider two vectors a = (10, 3, 8) and b = (4, 6, 1). What is a-b?
11. Find the inverse of the following matrix.

$$\begin{pmatrix} 2 & 3 & 7 \\ 1 & 4 & 23 \\ 31 & 55 & 2 \end{pmatrix}$$

12. Find the sum of the following matrix

$$\begin{pmatrix} 2 & 3 & 7 \\ 1 & 4 & 23 \\ 31 & 55 & 2 \end{pmatrix} \text{ and } \begin{pmatrix} 12 & 32 & 8 \\ 14 & 24 & 2 \\ 1 & 5 & 29 \end{pmatrix}$$

13. Find the product of the following matrix

$$\begin{pmatrix} 2 & 3 & 7 \\ 1 & 4 & 23 \\ 31 & 55 & 2 \end{pmatrix} \text{ and } \begin{pmatrix} 12 & 32 & 8 \\ 14 & 24 & 2 \\ 1 & 5 & 29 \end{pmatrix}$$

14. Find the transpose of the following matrix.

$$\begin{pmatrix} 2 & 3 & 7 \\ 1 & 4 & 23 \\ 31 & 55 & 2 \end{pmatrix}$$

15. Find the eigen values of the following matrix.

$$\begin{pmatrix} 12 & 32 & 8 \\ 14 & 24 & 2 \\ 1 & 5 & 29 \end{pmatrix}$$

16. Find the eigen vectors of the following matrix.

$$\begin{pmatrix} 12 & 32 & 8 \\ 14 & 24 & 2 \\ 1 & 5 & 29 \end{pmatrix}$$

17. Find the covariance matrix of the following matrix.

$$\begin{pmatrix} 12 & 32 & 8 \\ 14 & 24 & 2 \\ 1 & 5 & 29 \end{pmatrix}$$

18. Find the equation of the line connecting (6,3,8) and (5,9,4).
19. Find the point of intersection of the lines given by (2 i + 3 j + 5 k) + t . (2 i + 3 j + 7 k) and (i – j + 6 k) + t . (2 i + 5 j – 13 k).
20. Find the distance between the lines given by V1: (x – 2)/2 = (y – 1)/3 = (z)/4 and V2: (x – 3)/4 = (y – 2)/6 = (z – 5)/8.
21. Find the distance between the lines given by v1 = i – j – k + 2i – 3j + 4k and V2: (x – 3)/4 = (y – 2)/6 = (z – 5)/8.
22. Find the equation of a circle with center (3,2) and radius 7.
23. Find the equation of a circle with center (3,5) and passing through (8,4).
24. Find the point of intersection of the following circles c1 : center (3,7) and radius 4 and c2 : enter (3,12) and radius 1.
25. Find the point of intersection of the following circles c1 : center (3,7) and radius 4 and c2 : enter (3,12) and radius 9.
26. Find the point of intersection of the following circles c1 : center (3,7) and radius 4 and c2 : enter (3,12) and radius 4.
27. Find the point of intersection of the following circles c1 : center (3,7) and passing through (5,2) and c2 : enter (3,12) and radius 4.
28. Find the point of intersection of the following circles c1 : center (3,7) and passing through (5,2) and c2 : enter (3,12) and passing through (3,7).
29. Give the equation of the plane with normal vector (1 0 , 8 , 3) that contains the point (1 0 , 5 , 5) .
30. Find the general equation of the plane that passes through the point (5 , 1 , − 1) and is parallel to the two vectors (9 , 7 , − 8) and (− 2 , 2 , − 1) .
31. Consider the two planes 3x+5y+2z-3 = 0 and x+2y+2z-31 = 0. Where do they intersect?
32. Where does the plane 3x+5y+2z-3 = 0 and line v1 = i – j – k + 2i – 3j + 4k intersect?
33. A pot of sweets has 20 rosogollas, 45 pantuas, 30 kalakand and 5 langchas. If a sweet is randomly picked from the pot, what is the probability that it will be a langcha?
34. A circle is inscribed inside a square. If a point inside the square is selected at random, what is the probability that the point will also be inside the circle?

35. Consider the Ram wants to buy an english willow cricket bat. He has 8 options. The prices are ₹3500, ₹5000, ₹3500, ₹7500, ₹50000, ₹2500, ₹3550, and ₹7050 and probabilities of Ram buying each bat is 0.10, 0.15, 0.15, 0.20, 0.10 0.05, 0.10 0.15. Assuming that Ram buys exactly one bat, what is the expected cost?
36. Consider the Krishna wants to buy flutes. The flute store has 8 flutes with the prices ₹3500, ₹5000, ₹3500, ₹7500, ₹50000, ₹2500, ₹3550, and ₹7050, respectively and probabilities of Krishna buying each flute is 0.10, 0.15, 0.15, 0.20, 0.10 0.05, 0.10 0.15. Assuming that Krishna buys exactly two flutes, what is the expected cost?
37. Find the variance for the following set of numbers: 28, 29, 30, 31, 32.
38. Consider you are going to visit pandals for Durga Puja. For travel from one pandal to another, you are using Rapido. Suppose, Rapido randomly charges you from the list [₹40, ₹60, ₹55, ₹90, ₹140, ₹75] with probability [0.2, 0.3, 0.1, 0.15, 0.05, 0.2]. What is the probability that you will spend more than ₹180 if you travel 3 times?
39. Yashodha has 7 pots of curd. They weigh 3kg, 500g, 900g,1.2kg, 5kg, 4.1kg and 2.7kg respectively. She sells the curd @₹180/kg. She does not have any way to sell the curd partially from a pot. So you have to buy the contents of a whole pot. Suppose you buy the contents of 2 pots. Given that you definitely buy the contents of the pot containing 1.2kg curd what is the probability that you spend more than ₹350?
40. A pot of sweets has 20 rosogollas, 45 pantuas, 30 kalakand and 5 langchas. They cost ₹7, ₹8, ₹12 and ₹10 respectively. If you eat two sweets randomly from the pot, what is expected amount you pay?