Math 17B
Kouba
Discussion Sheet 10

1.) a.) Find a nonzero vector which is parallel to the vector $\begin{pmatrix} 3 \\ 5 \end{pmatrix}$.

b.) Find a nonzero vector which is perpendicular to the vector $\begin{pmatrix} 3 \\ 5 \end{pmatrix}$.

2.) a.) Find a nonzero vector which is parallel to the vector $\begin{pmatrix} 1 \\ -2 \\ -1 \end{pmatrix}$.

b.) Find a nonzero vector which is perpendicular to the vector $\begin{pmatrix} 1 \\ -2 \\ -1 \end{pmatrix}$.

3.) Find a nonzero vector which is perpendicular to the vector $\begin{pmatrix} 1 \\ -2 \\ -1 \end{pmatrix}$ and also perpendicular to the vector you found in problem 2.)b.).

4.) Find the line in parametric form which is

a.) in R^2 passing through the point $(2, -1)$ and parallel to the vector $\begin{pmatrix} 3 \\ 5 \end{pmatrix}$.

b.) in R^2 passing through the point $(3, 2)$ and perpendicular to the vector $\begin{pmatrix} -1 \\ -1 \end{pmatrix}$.

c.) in R^2 passing through the points $(4, 0)$ and $(-1, 3)$.

d.) in R^3 passing through the point $(0, 2, 1)$ and parallel to the vector $\begin{pmatrix} 3 \\ -1 \\ 2 \end{pmatrix}$.

e.) in R^3 passing through the points $(1, 2, 3)$ and $(4, 5, 6)$.

5.) Determine an equation for the plane passing through the point $(-1, 0, 4)$ and which is perpendicular to the vector $\begin{pmatrix} 2 \\ 1 \\ -3 \end{pmatrix}$.

6.) Consider the plane $x + 2y + 3z = 12$. Determine two points on the plane. Determine a vector which is perpendicular to the plane. Determine a vector which is parallel to the plane.

7.) Determine an equation of the plane which is parallel to the plane $3x - 2y + z = 0$ and which passes through the point $(1, -1, 0)$.

8.) Determine an equation of the plane which passes through the point $(1, -1, 0)$ and which is perpendicular to the line given parametrically by $L : \begin{cases} x = 3 + 2t \\ y = -1 - t \\ z = 2 + t \end{cases}$.

9.) Determine the line in parametric form which passes through the point $(2, -3, 1)$ and which is perpendicular to the plane $3x - y + z = 5$.

10.) Find three points which lie on the intersection of the planes $x - y + z = 1$ and $2x + y - z = 3$.

11.) Determine the line in parametric form which represents the intersection of the planes $x - y + z = 2$ and $3x + y - 4z = 1$.

12.) Determine the point of intersection of the plane $x - y + 2z = 4$ and the line given parametrically by $L : \begin{cases} x = t \\ y = 1 - t \\ z = 1 + 2t \end{cases}$.

13.) The following lines intersect. Determine their point of intersection :

$$L : \begin{cases} x = 1 + t \\ y = 2t \\ z = -1 + t \end{cases} \quad \text{and} \quad M : \begin{cases} x = s \\ y = 2 + s \\ z = -2 + s \end{cases}.$$

14.) Determine the angle θ between the vectors $\begin{pmatrix} 2 \\ -1 \\ 0 \end{pmatrix}$ and $\begin{pmatrix} 1 \\ -2 \\ 3 \end{pmatrix}$.

15.) Determine the angle θ between the vector $\begin{pmatrix} 3 \\ 2 \\ 1 \end{pmatrix}$ and the line given parametrically by

$$L : \begin{cases} x = 3t \\ y = 1 + t \\ z = 1 - 2t \end{cases}.$$

16.) Determine the angle θ between the planes $z = 2x - y$ and $x + 2y + 3z = 6$.

17.) Find the point of intersection of the plane $3x - 2y + z = 24$ and the line passing through the point $(2, -1, 3)$ which meets the plane orthogonally.

18.) Find the distance from the point $(0, 0, 0)$ to the plane given by $x - 2y + 3z = 4$.

19.) Find the distance from the point $(2, -1, 3)$ to the line given parametrically by

$$L : \begin{cases} x = 1 - t \\ y = t - 2 \\ z = 2t \end{cases}.$$

"Do not dwell in the past, do not dream of the future, concentrate the mind on the present moment."– Buddha