

Math 17B  
Vogler  
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  $\theta$  between the vectors  $\begin{pmatrix} 2 \\ -1 \\ 0 \end{pmatrix}$  and  $\begin{pmatrix} 1 \\ -2 \\ 3 \end{pmatrix}$ .

15.) Determine the angle  $\theta$  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  $\theta$  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