

AMAT 219 PRACTICE SHEET #8

1. Find an equation of the plane passing through the three points $(1, 2, -1)$, $(3, 1, 2)$, and $(1, 1, -1)$.
2. Find parametric equations of the straight line passing through the points $(1, 3, -2)$, and $(2, 7, -3)$.
3. Find an equation of the plane containing the line $\vec{r} = (2t, t + 1, 3 - t)$ and the point $(0, 3, 5)$.
4. Find an equation of the plane passing through the origin and is perpendicular to the line $\vec{r} = (1, -1, 2) + t(2, -1, 3)$.
5. Find parametric equations of the straight line which passes through the point $(1, -2, -1)$ and is perpendicular to the plane $3x - y + 2z = 6$.
6. Find the shortest distance from the point $(1, 2, -5)$ to the plane $6x - 3y + 2z = 4$.
7. Find the shortest distance from the point $(8, 3, 1)$ to the straight line $x = 7 + 2t$, $y = 3 + 2t$, $z = 2 - t$, ($t \in \mathbb{R}$).
8. Find an equation of the plane containing the two straight lines $\vec{r} = (1, -1, 2) + t(2, -1, 3)$, $(x, y, z) = (2 + 3t, -1 - 2t, 1 + 7t)$, ($t \in \mathbb{R}$).
9. Find parametric equations of the line of intersection of the planes $2x - y + 3z = 2$, $3x - 2y + 2z = -1$.
10. Show whether the straight lines $\vec{r} = (1, -1, 2) + t(2, -1, 3)$, $\vec{r} = (2, -1, 1) + s(3, -2, -9)$, ($t, s \in \mathbb{R}$) intersect and if so determine the point of intersection.
11. Find the point of intersection (if any) of the two lines
$$L_1 : \begin{cases} x = 2 + t \\ y = 4 - 3t \\ z = 1 + 2t \end{cases}, t \in \mathbb{R}, \quad L_2 : \begin{cases} x = 2s + 7 \\ y = -s - 1 \\ z = s + 5 \end{cases}, s \in \mathbb{R}.$$
12. Find the area of the parallelogram $ABCD$ with vertices at the points $A(1, 1, -2)$, $B(3, -1, 1)$, $C(4, -1, 1)$, and $D(2, 1, -2)$.
13. Find a unit vector orthogonal to both vectors $\vec{a} = (3, -2, 6)$, and $\vec{b} = (1, 1, -8)$.
14. Find exact angle between the vectors $\vec{u} = (2, 2, -1)$, and $\vec{v} = (1.0, -1)$.
15. Find area of the triangle with vertices at the points $(7, 3, 2)$, $(9, 5, 1)$, and $(8, 3, 1)$.

ANSWERS

1. $3x - 2z = 5$ 2. $x = 1 + t, y = 3 + 4t, z = -2 - t$ 3.
 $x - y + z = 2$

4. $2x - y + 3z = 0$ 5. $(x, y, z) = (1 + 3t, -2 - t, -1 + 2t)$ 6.
2 7. 1

8. $x + 5y + z + 2 = 0$ 9. $x = 5 - 4t, y = 8 - 5t, z = t.$ 10.
Lines do not intersect !

11. $(3, 1, 3)$ 12. $\sqrt{13}$ 13. $\vec{n} = \pm \frac{1}{\sqrt{41}}(2, 6, 1)$ 14. $\frac{\pi}{4}$
15. $\frac{3}{2}$