CLASS TEST III REVIEW

The sections are: 3.3, 3.4, 3.5,

(1) If $u=(1,1,3), v=(2,0,1), w=(0,-1,5)$ **then find:**

(a) $2u+w$ **(b)** $2(u+v)-3(v-2w)$ **(c)** $(u\cdot v)w$ **(d)** $u\cdot(v\times w)$
(e) $\|v\|(u\cdot w)$ **(f)** $\|u\times(v+w)\|$

(2) Let $u=(1,1,3), v=(2,0,1), w=(0,-1,5)$**. Compute the following:**

(a) $u-2v+w$ **(b)** $w\cdot u-\|5v\|$ **(c)** $(2u-v)\times w$ **(d)** $(u\times v)\times w$
(e) $(u\times w)\times(u\times v)$ **(f)** $(v\times w)\cdot u$

(3) Find the vector component of u **parallel to** a**:**

(a) $u=(6,5),\ a=(-3,4)$
(b) $u=(1,2),\ a=(7,-3)$
(c) $u=(3,0,2),\ a=(1,1,3)$

(4) Find the vector component of u **orthogonal to** a**:**

(a) $u=(4,1),\ a=(2,-3)$
(b) $u=(5,-2),\ a=(1,1)$
(c) $u=(1,5,-5),\ a=(1,2,3)$

(5) Consider the points $A(2,6), B(3,7), C(3,8)$**. Compute the following:**

(a) $\cos < ABC$
(b) $\cos < BAC$
(c) $\cos < ACB$

(6) Calculate the distance between the given point and line:

(a) $x-2y+3=0$, $(2,1)$
(b) $5x+12y-2=0$, $(2,-1)$

(7) Find the area of the triangle PQR:

(a) $P(1,3,2), Q(2,3,1), R(2,2,3)$
(b) $P(3,-3,1), Q(1,-3,2), R(5,-2,-1)$
(c) $P(3,0,-1), Q(2,2,2), R(4,2,3)$

(8) Find the area of the triangle determined by u and v:

(a) $u=(1,2,4),\ v=(3,1,2)$
(b) $u=(1,-1,2),\ v=(2,0,3)$

(9) Find the area of the parallelogram determined by u and v:

(a) $u=(1,0,-2),\ v=(0,3,2)$
(b) $u=(2,0,2),\ v=(0,2,1)$

(10) Determine whether the lines are parallel:

$$\begin{aligned} x &= 2+t \\ y &= 1+2t \\ z &= 1+t \end{aligned} \quad \textbf{and} \quad \begin{aligned} x &= 4+t \\ y &= 2+2t \\ z &= 4+t \end{aligned}$$

(11) Determine whether the planes are parallel:

(a) $4x+y-7z=1,\ 4x+y-7z=0$
(b) $-x+2y-z=1,\ 3x+6y+3z=5$

(12) Determine whether the planes are perpendicular:

(a) $2x-3y+z=0,\ 4x-6y+2z=3$
(b) $x-3y+5z=2,\ 4x+3y+z=0$

(13) Determine whether the line and plane are parallel:

$$\begin{aligned} x &= 2+4t \\ y &= 1-3t \\ z &= t \end{aligned}, \quad x+y-z=5$$

(14) Determine whether the line and plane are perpendicular:

$$\begin{aligned} x &= 3+2t \\ y &= 14t \quad , \; x+7y = 2+6z \\ z &= 1+12t \end{aligned}$$

(15) Give the point of intersection, if any, of the line and plane:

(a) $\begin{aligned} x &= 4+2t \\ y &= 7-t \quad , \; 2x-y-z=7 \\ z &= 3t \end{aligned}$

(b) $\begin{aligned} x &= t-3 \\ y &= 2t \quad , \; x-4y-z=0 \\ z &= t+5 \end{aligned}$

(16) Find a parametric equation for the line of intersection of the planes:

$x+2y-z=1,\; 2x-y+3z=7$

(17) Find a parametric equation for the line passing through the given points:

$P(1,6,3), Q(2,7,1)$

(18) Find a general form of the equation of the plane passing through P and having n as normal:

(a) $P(2,3,4), n=(6,1,6)$

(b) $P(8,-8,2), n=\left(-\frac{2}{3},\frac{1}{3},\frac{2}{3}\right)$

(29) Find the equation of the plane passing through the given points:

(a) $P(3,1,1), Q(1,6,7), R(4,2,2)$

(b) $P(3,4,4), Q(0,1,-11), R(1,3,-17)$

(20) Find an equation of the plane through $P(1,1,3)$

that is perpendicular to the line $\begin{aligned} x &= 2-3t \\ y &= 1+t \\ z &= 2t \end{aligned}$.

(21) Find an equation of the plane through $P(2,7,-1)$ **that is parallel to the plane** $4x-y+3z=3$.

(22) Find an equation of the plane that contains the line $\begin{aligned} x &= 3+t \\ y &= 5 \\ z &= 5+2t \end{aligned}$ **, and is perpendicular to the plane** $x+y+z=4$.

(23) Find an equation of the plane through $P(1,4,4)$ **that contains the line of intersection of the planes** $x-y+3z=5$ **and** $2x+2y+7z=0$.

(24) Find an equation of the line through $P(2,-3,0)$ **that is parallel to the planes** $2x+2y+z=2$ **and** $x-3y=5$.

(25) Find an equation of the plane through $P(-1,7,4)$ **that is perpendicular to the planes** $3x+y-z=5$ **and** $11x+2y+3z=0$.

(26) Calculate the distance between the given point and the plane:

(a) $2x-3y+6z+4=0$, $(1,1,-1)$
(b) $z=2x+2y+8$, $(11,-2,3)$