1) Determine whether each point lies on the line represented by the parametric equation:
$x=-2+t,\ y=3t,\ z=4+t$
   a) $(0,6,6)$
   b) $(2,3,5)$

2) Determine whether each point lies on the line represented by the symmetric equation: $\frac{x-3}{2}=\frac{y-7}{8}=z+2$
   a) $(7,23,0)$
   b) $(1,-1,-3)$

3) A line passes through the points $(0,4,3)$ and $(-1,2,5)$, find the following (write the direction number as integers):
   a) Parametric equations of the line.
   b) Symmetric equations of the line.

4) Find a set of parametric equations of the following lines:
   a) The line that passes through the point $(2,3,4)$ and is parallel to the xz-plane and the yz-plane .
   b) The line that passes through the point $(2,3,4)$ and is perpendicular to the plane given by $3x+2y-z=6$
   c) The line that passes through the point $(5,-3,-4)$ and is parallel to $\vec{v}=\langle 2,-1,3\rangle$.
   d) The line that passes through the point $(2,1,2)$ and is parallel to the line: $x=-t,\ \ y=1+t,\ \ z=-2+t$

5) Determine which of the following lines are parallel and which once are identical.

$$L_1:\ x=6-3t,\ \ y=-2+2t,\ \ z=5+4t$$
$$L_2:\ x=6t,\ \ y=2-4t,\ \ z=13-8t$$
$$L_3:\ x=10-6t,\ \ y=3+4t,\ \ z=7+8t$$
$$L_4:\ x=-4+6t,\ \ y=3+4t,\ \ z=5-6t$$

6) Determine the point where the lines intersect and the cosine of the angle of intersection.

$$x=4t+2,\ \ y=3,\ \ z=-t+1$$
$$x=2s+2,\ \ y=2s+3,\ \ z=s+1$$

7) Determine whether the plane $x+2y-4z-1=0$ passes through each point.

a) $(-7,2,-1)$

b) $(5,2,2)$

8) Find an equation of the plane:

a) The plane passes through $(3,-1,2)$, $(2,1,5)$, and $(1,-2,-2)$.

b) The plane passes through the point $(1,2,3)$ and is parallel to $yz\text{-plane}$.

c) The plane contains the lines given by: $\dfrac{x-1}{-2} = y-4 = z$ and $\dfrac{x-2}{-3} = \dfrac{y-1}{4} = \dfrac{z-2}{-1}$

d) The plane passes through the point $(2,2,1)$ and contains the line given by: $\dfrac{x}{2} = \dfrac{y-4}{-1} = z$

e) The plane passes through the points $(2,2,1)$ and $(-1,1,-1)$ and is perpendicular to the plane $2x-3y+z=3$.

f) The plane passes though the points $(4,2,1)$ and $(-3,5,7)$ and is parallel to the $z\text{-axis}$.

9) Find the points where the line $x=1-2t,\ \ y=-1+3t,\ \ z=-4+t$ intersects the xy, xz and $yz\text{-planes}$.

10) Find an equation of the plane that contains all the points that are equidistant from the points: $(2,2,0)$ and $(0,2,2)$

11) Determine whether the planes are parallel, orthogonal or intersect. If they intersect find the angle of intersection.

$$x-3y+6z=4$$
$$5x+y-z=4$$

12) Find the x, y and z intercepts of the plane $4x+2y+6z=12$.

13) Find a set of parametric equations for the line of intersection of the planes:

$$3x+2y-z=7$$
$$x-4y+2z=0$$

14) Find the point(s) of the intersection (if any) of the plane $2x-2y+z=12$ and the line $x-\frac{1}{2}=\frac{y+(3/2)}{-1}=\frac{z+1}{2}$.

Also determine whether the line lies in the plane.

15) Find the distance between the point $(2,8,4)$ and the plane $2x+y+z=5$.

16) Verify that the two planes are parallel, and find the distance between the planes.

$$x-3y+4z=10$$
$$x-3y+4z=6$$

17) Find the distance between the point $(1,-2,4)$ and the line $x=2t,\ \ y=t-3,\ \ z=2t+2$.

18) Verify that the lines are parallel, and find the distance between them:

$$L_1:\ x=2-t,\ \ y=3+2t,\ \ z=4+t$$
$$L_2:\ x=3t,\ \ y=1-6t,\ \ z=4-3t$$

19) Find the distance between the skew lines:

$$x = 1 + t,\quad y = 1 + 6t,\quad z = 2t$$
$$x = 1 + 2s,\quad y = 5 + 15s,\quad z = -2 + 6s$$

20) Find the standard equation of the sphere with center $(-3, 2, 4)$ that is tangent to the plane given by $2x + 4y - 3z = 8$.