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

a) $(0,6,6)$ $\boxed{\text{Yes}}$

b) $(2,3,5)$ $\boxed{\text{No}}$

2) Determine whether each point lies on the line represented by the symmetric equation: $\dfrac{x-3}{2}=\dfrac{y-7}{8}=z+2$

a) $(7,23,0)$ $\boxed{\text{Yes}}$

b) $(1,-1,-3)$ $\boxed{\text{Yes}}$

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.

a) $\boxed{x=t,\ y=4+2t,\ z=3-2t}$

b) $\boxed{x=\dfrac{y-4}{2}=\dfrac{z-3}{-2}}$

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: $x=-t,\ y=1+t,\ z=-2+t$

a) $\boxed{x=2,\ y=3,\ z=4+t}$

b) $\boxed{x=2+3t,\ y=3+2t,\ z=4-t}$

c) $\boxed{x=5+2t,\ y=-3-t,\ z=-4+3t}$

d) $\boxed{x=2-t,\ y=1+t,\ z=2+t}$

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

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

$\boxed{L_1 \text{ and } L_2 \text{ are identical. } L_1 \text{ and } L_2 \text{ are parallel to } L_3}$

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

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

$$\boxed{(2,3,1),\ \ \cos\theta=\frac{7\sqrt{17}}{51}}$$

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

a) $(-7,2,-1)$ $\boxed{\text{Yes}}$

b) $(5,2,2)$ $\boxed{\text{Yes}}$

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-plane.

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

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

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-axis.

a) $\boxed{x+2y-z+1=0}$

b) $\boxed{x=1}$

c) $\boxed{x+y+z=5}$

d) $\boxed{x-2z=0}$

e) $\boxed{7x+y-11z=5}$

f) $\boxed{3x+7y=26}$

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

$$\boxed{(-7,10,0),\ \left(-\frac{1}{3},0,-\frac{10}{3}\right),\ \left(0,-\frac{1}{2},-\frac{7}{2}\right)}$$

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

$$\boxed{x-z=0}$$

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

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

$\boxed{\text{Intersect, } \theta \approx 83.5°}$

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

$\boxed{(3,0,0),\ (0,6,0),\ (0,0,2)}$

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

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

$\boxed{x=2,\ \ y=1+t,\ \ z=1+2t}$

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.

$\boxed{(2,-3,2), \text{The line does not lie in the plane.}}$

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

$$\boxed{\frac{11\sqrt{6}}{6}}$$

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

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

$$\boxed{\frac{2\sqrt{26}}{13}}$$

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

$$\boxed{\frac{\sqrt{5}}{3}}$$

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

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

$$\boxed{\frac{\sqrt{66}}{3}}$$

19) Find the distance between the skew lines:

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

$\boxed{2}$

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

$$\boxed{(x+3)^2 + (y-2)^2 + (z-4)^2 = \frac{324}{29}}$$