Problem Set Week 3 and 4

1. For the following:
   a. Find the parametric and symmetric equations of the line through the point P(-1,4,2) and parallel to $\vec{v}$ = <1, 2,3>.
   b. Find two points on the line

2. Using the point (0,6,5) and the vector $\vec{v}$ from question one, find the parametric equations of the line.

3. Write an equation of a plane through P(2,4,-1) with normal vector $\vec{n} = 2\vec{i} + 3\vec{j} + 4\vec{k}$. Find the intercepts and sketch the plane

4. Find a normal vector to the plane $-x + 3y + 2z = 7$

5. Find the equation for the plane through the points (0,1,-7), (3, 1, -9), and (0, -5,-8).

6. Show that the planes $x + 2y - 3z = 4$ and $2x + 4y - 6z = 3$ are parallel.

7. Find the distance between the point (1,5,-4) and the plane $3x - y + 2z = 6$.

8. Find the distance between the parallel planes $z = x + 2y + 1$ and $3x + 6y - 3z = 4$

9. Find the symmetric equation for line through point (1,-5,6) and is parallel to vector <-1,2,-3>.

10. Find the line of intersection of two planes $x + y + z = 1$ and $x + 2y + 2z = 1$.

11. Find the parametric equation of line through point (1, -1, 1) and parallel to line $x + 2 = \frac{y}{2} = z - 3$.

12. Find the equation of plane through points (3,-1,2), (8,2,4), and (-1, -2, -3).

13. Find the symmetric equation of line of intersection of planes $5x - 2y - 2z = 1$ and $4x + y + z = 6$

14. *Find the point at which line $x = 3 - t$, $y = 2 + t, z = 5t$ intersects the plane $x - y + 2z = 9$*

15. Find the equation of the line which passes through (2,1) and is at right angles to the line $3x - 4y = 5$

16. Find the points where the line $2x + 3y = 6$

17. Find the distance between the points (2,3,5) and (4,3,1)

18. Show that the points (0,4,1), (2,3,-1),(4,5,0) and (2,6,2) are the vertices of a square.

19. Prove that the points (3,-1,4), (1,6,8) and (9,-22,-8) are collinear.

20. Obtain the equation of the line passing through (1,-1,2) having direction ratios (2,0,1)

21. Find the point of intersection of the plane $3x - y + 2z = 3$ and the line $\frac{x+1}{3} = \frac{y+1}{2} = \frac{z-1}{-2}$.

22. Find the equation of the plane passing through the points (2,1,3), (1,3,2) and (-1,2,4).