Review problems for the final Part I: Vectors and space
December 14, 2007

1. Find the area of the triangle $ABC$ for $A(1,2,3)$, $B(3,4,2)$ and $C(5,3,4)$.

2. Find the volume of the parallelepiped formed by the vectors

$$\vec{a} = \langle 1,-2,3\rangle\,,\ \vec{b} = \langle 2,-3,1\rangle \text{ and } \vec{c} = \langle 3,1,2\rangle\,.$$

3. Find the angle between vector $\overrightarrow{AB}$ and vector $\overrightarrow{AC}$ for $A(1,-2,3)$, $B(3,4,-2)$ and $C(-5,3,4)$.

4. Determine the symmetric equation of the line passing through $A(1,-2,3)$ and $B(3,4,-2)$.

5. Find the equation of the plane which contains the points $A(1,-2,3)$, $B(3,4,-2)$ and $C(-5,3,4)$.

6. Find the equation of the plane which is parallel to vectors $\vec{a} = \langle 1,-2,3\rangle$, $\vec{b} = \langle 2,-3,1\rangle$ and contains point $P(3,1,2)$.

7. Find the distance between two parallel planes

$$2x - y + 2z = 3 \text{ and } 4x - 2y + 4z = 1.$$

8. Find the angle between two planes

$$x + 2y + z = 2 \text{ and } x - 2y + z = 3.$$

9. Given $P(1,-1,2)$ in rectangular coordinates, find its cylindrical coordinates.

10. Given $P\left(2, \frac{2\pi}{3}, -4\right)$ in cylindrical coordinates, find its rectangular coordinates.

11. Change the equation $x^2 + y^2 = z + 1$ into cylindrical coordinates.

12. Given $P\left(1,-1,\sqrt{6}\right)$ in rectangular coordinates, find its spherical coordinates.

13. Given $P\left(4,-\frac{\pi}{4},\frac{\pi}{3}\right)$ in spherical coordinates, find its rectangular coordinates.

14. Change the equation $\rho = 4\cos\phi$ into rectangular coordinates and identify the surface the equation represents.