

Homework 7

due 4/6

Score _____

1. State necessary and sufficient conditions for the lines defined by the equations $\mathbf{r} = \mathbf{r}_1 + \mathbf{a}_1 t$ and $\mathbf{r} = \mathbf{r}_2 + \mathbf{a}_2 t$
 - (1) to intersect in a unique point;
 - (2) to be parallel, but not coinciding;
 - (3) to coincide.
2. Two lines are given by their equations $\mathbf{r} \cdot \mathbf{n} = D$ and $\mathbf{r} = \mathbf{r}_0 + \mathbf{a}t$. Find a formula for the position vector of their intersection point.
3. Given a point with a position vector \mathbf{r}_0 and a line $\mathbf{r} \cdot \mathbf{n} = d$. Find the position vector of the projection of the point to the line.
4. Find the formula for the distance between the point with position vector \mathbf{r}_0 and the line $\mathbf{r} = \mathbf{r}_1 + \mathbf{a}t$.
5. Find an equation of the line such that it passes through the point $(1, 1)$ and this point is the midpoint of the segment between the intersection points of this line with the lines $3x + y + 2 = 0$ and $4x + y - 1 = 0$.