Practice Test 1 — Math 264 — Fall 2009

September 29, 2009

1. Find $\vec{a} \times \vec{b}$ where

    (a) $\vec{a} = (1, 0, -1)$ and $\vec{b} = (1, 2, -1)$

    (b) $\vec{a} = (1, 1, 0)$ and $\vec{b} = (1, 0, 1)$

2. Find the vector project of $\vec{a} = (1, 0, -1)$ onto $\vec{b} = (1, 2, -1)$.

3. Let $\vec{a} = (1, 0, 1)$ and $\vec{b} = (2, 0, 1)$.

    (a) Compute the dot product of the two vectors.

    (b) Find the angle between $\vec{a}$ and $\vec{b}$.

4. Let $\vec{l_1}(t) = (0, 2, 1) + (1, -2, -1)t$ and $\vec{l_2}(t) = (1, 0, 0) + t(1, 1, 1)$.

    (a) Determine the point where the two lines intersect.

(b) Determine an equation of the plane that contains both of the lines.

5. Find the distance between the point and $P = (2, 2, 2)$ and the line $\vec{l}(t) = (1, 1, 1) + (-1, 0, 2)t$.

6. Find the distance between the point $P = (0, 0, 0)$ and the plane $x + y + z + 1 = 0$.

7. Find a parametrization for the line that the intersection of the two planes

$$\begin{cases} x + y + z + 1 = 0, \\ 2x - y = 0 \end{cases}$$

8. Classify the quadric surface.

$$x^2 - 2x + y^2 - 4y + -z^2 - 2z = 0$$

9. Trajectories for two particles are given by $\vec{a}(t) = (t, t^2, t^3)$ and $\vec{b}(t) = (t, 2t, 3t + 2)$.

   (a) Do the paths defined by $\vec{a}(t)$ and $\vec{b}(t)$ intersect?
   (b) Do the particles collide?

10. Give a parametrization for the line that passes through the points $(-1, 2, 0)$ and $(2, 0, 0)$ then write it down in parametric form.