Universidad de los Andes — Departamento de Mátematicas

MATE-1207: Calculo vectorial

Primer Parcial 200820

Código: _____ Nombre: _____

Problem 1	Problem 2	Problem 3	Sum

Solve the following problems. Give all necessary steps to find the solutions. Hand in this sheet and all sheets of paper you used. Put your name on every sheet of paper you hand in.[1]

Good luck!

1. (a) Find the linear equation of the plane S_1 that contains the points $P_1(0,1,1)$, $P_2(-1,2,3)$, $P_3(2,2,3)$. — 4 pts.

   (b) Find the linear equation of the plane S_2 that is orthogonal to the line — 4 pts.

   $$L:\ \vec{r}(t) = t\langle 1,2,3\rangle, \quad t \in \mathbb{R},$$

   and contains the point $Q(4,3,2)$.

   (c) Are the planes S_1 and S_2 parallel? Find the intersection of S_1 and S_2. — 4 pts.

   (d) Does the point $R(1,6,1)$ lie on S_1? Does it lie on S_2? Find the line K which contains R and is perpendicular to S_1. Where does it intersect S_1? — 5 pts.

2. (a) Describe in words and sketch the quadric — 8 pts.

   $$S: 4x^2 + y^2 + z^2 + 2y - 3 = 0.$$

   (b) Find a parametrization for the curve that is the intersection of S with the plane $T: z = 1$. — 8 pts.

3. (a) Let C be the curve described by — 8 pts.

   $$x(t) = \mathrm{e}^t,\ y(t) = \mathrm{e}^{-t},\ z(t) = \sqrt{2}\,t.$$

   Compute the length of the curve C between the points $P(1,1,0)$ and $Q(\mathrm{e}^2, \mathrm{e}^{-2}, 2\sqrt{2})$.

   (b) Find the unit tangent vector, the unit normal vector and the curvature at the point $R(\mathrm{e}, \frac{1}{\mathrm{e}}, \sqrt{2})$. — 9 pts.

[1] Resuelva las siguintes preguntas (sin desarrollo sus respuestas no valen!). Escriba ordenadamente y devuelva esta hoja con todas las hojas que haya utilizado. Escriba su nombre en cada hoja que haya utilizado. Respete el juramento uniandino: cualquier caso de fraude será reportado. Buena suerte!