

## Tercero Parcial 200820, 30 Octubre 2008

CÓDIGO: \_\_\_\_\_ NOMBRE: \_\_\_\_\_

Problem 1	Problem 2	Problem 3	Problem 4	Problem 5	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.<sup>1</sup>

Good luck!

**Problem 1.** Let  $B \subseteq \mathbb{R}^2$  be the region which is bounded by the curves  $y = \frac{1}{4}x^2$  and  $y = \frac{3}{2}x - 2$  and let

$$f : B \rightarrow \mathbb{R}, \quad f(x, y) = \frac{y}{x^2}.$$

- 2 pts. (a) Sketch  $B$ .
- 2 pts. (b) Express  $\iint_B f(x, y) \, dA$  as an iterated integral.
- 2 pts. (c) Change the order of integration of the iterated integral in (a).
- 4 pts. (d) Evaluate  $\iint_B f(x, y) \, dA$ .

10 pts. **Problem 2.** Sketch  $C = \{(x, y) : x^2 + y^2 \geq 9, x^2 + y^2 + 6x \leq 0\}$  and find its area.

- 6 pts. **Problem 3.** (a) Find the volume of the solid inside the cylinder  $x^2 + y^2 = 4$  and outside the cylinder  $x^2 + y^2 = 1$  that lies between the planes  $x - 2z = 0$  and  $x - 2z = 6$ .
- 4 pts. (b) Find the mass of the solid described in (a) if the mass density is proportional to the distance from the  $z$ -axis.

10 pts. **Problem 4.** Let  $S$  be the sphere centred at the origin with radius  $R = 1$  and let  $T = \{(x, y, z) : y \leq -\sqrt{x^2 + z^2}\}$ . Sketch  $S \cap T$  and find its volume.

10 pts. **Problem 5.** Use the transformation  $u = \frac{1}{2}(x + y)$ ,  $v = \frac{1}{2}(x - y)$  to evaluate the integral

$$\iint_D \sin(\pi(x + y)) \cos\left(\frac{\pi}{2}(x - y)\right) \, dA$$

where  $D$  is the parallelogram with vertices  $(1, 1)$ ,  $(2, 0)$ ,  $(2, 2)$  and  $(3, 1)$ .

<sup>1</sup>Resuelva las siguientes 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!