

## Spring 2009: Math 241 (Section 02); Practice EXAM 3 (bis)

1. Use the method of Lagrange multipliers to find the point(s) on the line  $4x + y = 1$  that are closest from the point  $(-1, -2)$

2. Consider the function  $f(x, y) = -2x^2 + 3xy + y^2 - 4x + 3y - 1$ . Find the extreme values of  $f$  in the region  $R$  described by  $x^2 + y^2 \leq 4$ .

3. Consider the following integral

$$I = \iint_R (x^2 + y) dA$$

where  $R$  is the triangular region bounded by the line  $y = 1$ ,  $y = x$  and  $x = 0$ .

(a.) Sketch  $R$ . Is  $R$  a simple region?

(b.) Express  $I$  as an iterated integral and evaluate it.

4. Consider the following double integral

$$I = \iint_R (x^2 + y) dA,$$

where  $R$  is the region in the first quadrant of the  $xy$  plane bounded by the line  $y = 0$  and  $y = \frac{\sqrt{3}}{3}x$  and the circle  $r = 1$ .

Express this integral as an iterated integral in polar coordinates and evaluate it.