Summer 2007-08 MATH 116 Homework 2

Due on July 2, 2008.
No late homework will be accepted.

1. Use the method of Lagrange multipliers to find the maximum and minimum values of the function

$$f(x,y) = x^2 + 2y^2 + 2x + 3$$

   subject to the constraint $x^2 + y^2 = 4$.

2. Does the following limit exist

$$\lim_{(x,y)\to(0,0)} \frac{e^{x+y} - 1 - x - y - xy}{x^2 + y^2}.$$

   Calculate the above limit if it exists. (Hint: You might want to use Taylor's formula for functions of two independent variables.)

3. Calculate $\displaystyle\int_2^3 \int_2^y \frac{\sin(x)}{x}\,dxdy + \int_3^4 \int_2^3 \frac{\sin(x)}{x}\,dxdy + \int_4^9 \int_{\sqrt{y}}^3 \frac{\sin(x)}{x}\,dxdy.$

4. Calculate the area of the region enclosed by the curve $r = \cos(2\theta)$.

5. Calculate the improper integral

$$\int_{-\infty}^{\infty} \int_{-\infty}^{\infty} e^{-(x^2+y^2)}\,dxdy.$$