

MA 227: CALCULUS III
TEST #2, MARCH 21, 2002

Time limit: 100 min.

Your name:

Your student ID:

1. Find the local maximum and minimum values and saddle points of the function

$$f(x, y) = x^2 + y^2 + \frac{1}{x^2 y^2}.$$

20 points

2. Find the local maximum and minimum values and saddle points of the function

$$f(x, y) = e^y \cos x.$$

20 points

3. Find the extreme values (absolute minimum and maximum) of the function

$$f(x, y) = 2x^2 + 3y^2 - 4x$$

on the region defined by the inequality $x^2 + y^2 \leq 16$.

20 points

4. Find the absolute minimum and maximum values of the function $f(x, y, z) = x^2 + y^2 + z^2$ subject to the constraint $x^4 + y^4 + z^4 = 1$.

20 points

5. Calculate the iterated integral

$$\int_0^1 \int_0^1 \frac{xy}{\sqrt{x^2 + y^2 + 1}} dy dx.$$

20 points

6. Find the volume of the solid S bounded by the elliptic paraboloid $z = x^2 + 4y^2 - 2x + 2$, the planes $x = 3$ and $y = 2$, and the coordinate planes.

20 points