

UNIVERSITY OF TORONTO
DEPARTMENT OF MATHEMATICS

MAT 235 Y - CALCULUS II
TEST #2. SECTION L-0501

JULY 22, 1997

NAME:

STUDENT No.:

(Family name. Please PRINT.) (Given name.)

INSTRUCTIONS: Show all your work in all questions. Give your answers in the space provided. Use both sides of paper, if necessary. Do not tear out any pages. No calculators or any other aids are permitted. This test consists of six questions. The value of each question is indicated (in brackets) by the question number. Total marks:120. This test is worth 25% of your course grade. Time allowed: 120 minutes.

1. (20 marks) Find the dimensions of the rectangle with the largest area inscribed in the ellipse $9x^2 + y^2 = 16$ and such that its sides are parallel to the coordinate axes.

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2. (20 marks) Find the extreme values of the function $f(x, y, z) = x + y + z$ on the sphere $x^2 + y^2 + z^2 = 3$.

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3. (20 marks) Find the critical points of the function $f(x, y) = x^3 + y^2 - 6xy + 6x + 3y$, and use the second derivative test to classify them as local maxima, local minima or saddle points.

4. (20 marks) Compute $\iint_R (x^{1/2} - y^2) dA$, where R is the region enclosed between the curves $y = x^2$ and $y = x^{1/4}$.

5. (20 marks) Compute the surface area of the part of the paraboloid $z = 4 - x^2 - y^2$ lying above the xy -plane.

6. (20 marks) Compute $\iiint_R z \sqrt{x^2 + y^2 + z^2} dV$, where R is the region inside the cone $z^2 = x^2 + y^2$, $z \geq 0$ and inside the sphere $x^2 + y^2 + z^2 = 4$.