

MATH 233 EXAM #2. Fall 2003

In problems that require reasoning, algebraic calculation, or the use of your graphing calculator, it is not sufficient just to write the answers. You must explain how you arrived at your answers, show your algebraic calculations, and indicate how you used your graphing calculator.

If approximate numerical answers are used, they should be rounded off to 5 significant digits.

$\langle x, y, z \rangle$, $[x, y, z]$ are permissible notations for $x\mathbf{i} + y\mathbf{j} + z\mathbf{k}$

1. (18 points) Find the absolute maximum and minimum of the function $f(x, y, z) = xy + yz$ on the ellipsoid $x^2 + 2y^2 + z^2 = 1$.

2. (a) (12 points) Express the iterated integral

$$\int_0^4 \int_{\sqrt{y}}^2 e^{x^3} dx dy$$

as an iterated integral in the opposite order.

(b) (6 points) Evaluate the resulting integral.

3. (16 points) Use a double integral in polar coordinates to find the volume of the solid that lies above the xy plane and below the surface $z = 9 - x^2 - y^2$.