Math 3322-001 Exam II-A September 21, 2007

Answer the problems on **separate** paper. You do not need to rewrite the problem statements on your answer sheets. Do your own work. Show **all relevant steps** which lead to your solutions. Attach this question sheet to the front of your answer sheets.

1. (8 pts) Let $f(x,y) = x^3 \sin(xy^2)$. Find $\frac{\partial f}{\partial x}$ and $\frac{df}{\partial y}$.

2. (25 pts) Let $f(x,y) = e^{-y}(x^2 y + 3y)$. Find $\frac{\partial f}{\partial x}$, $\frac{df}{\partial y}$, $\frac{\partial^2 f}{\partial x^2}$, $\frac{\partial^2 f}{\partial y^2}$ and $\frac{\partial^2 f}{\partial y \partial x}$.

3. (12 pts) The formula for impedance in a circuit is $Z = \sqrt{4X + R^2}$. If X is measured to be $20.00\,\Omega$ with an error of $\pm 0.04\Omega$ and R is measured to be $30.00\,\Omega$ with an error of $\pm 0.05\Omega$, (use the total differential to) find the approximate maximum error in Z.

4. (20 pts) Find and classify any possible maxima and/or minima of the function $f(x,y) = x^2 + 2y^3 - x - 6y + 4$.

5. (12 pts) Evaluate the iterated integral $\int_0^1 \int_0^y (4x + y)\, dx\, dy$.

6. Omit

7. (12 pts) Use an iterated integral to find the area of the region R where R is the region in the first quadrant bounded by the curves $y = \sqrt{x}$, $y = 2$ and the $y-$axis.

8. (12 pts) Find the volume of the solid in the first octant which lies above the triangular region bounded by the planes $x = 0$, $y = 0$, and $2x + y = 2$ and below the paraboloid $z = 4 - x^2 - y^2$.