

MA 227: CALCULUS II
MIDTERM TEST #3, NOVEMBER 22, 2005

Time limit: 105 min.

Your name (print):

Your signature:

1. Find the average value of the function $f(x, y) = e^x \sqrt{y + e^x}$ on the rectangle $[0, 1] \times [0, 4]$.

10 points

2

2. Find

$$\iint_D xy dA,$$

where D is the triangular region with vertices $(0, 0)$, $(1, 2)$, and $(0, 3)$.

10 points

3. Evaluate the integral

$$\int_0^1 \int_{y^2}^1 y^3 \sin(x^3) dx dy$$

by reversing the order of integration.

10 points

4

4. Find the integral

$$\iint_R xe^y dA$$

by switching to polar coordinates, where R is the region in the first quadrant enclosed by the circle $x^2 + y^2 = 4$. (Note: Mind the order of integration!)

10 points

5. A lamina occupies the region inside the circle $x^2 + y^2 = 2x$ but outside the circle $x^2 + y^2 = 1$, and the mass density function is $\rho(x, y) = (x^2 + y^2)^{-1/2}$. Find the center of mass. (Save some substantial work by being smart!)

10 points

6

6. Evaluate the integral

$$\int_0^1 \int_z^{2z} \int_0^y 2xyz dx dy dz.$$

10 points

7. Evaluate

$$\iiint_E y dV,$$

where E is bounded by the three coordinate planes and by the plane $3x + 3y + z = 8$.
10 points