MATH 241H Dr. Wolfe SAMPLE THIRD HOUR EXAM Spring 2010

The Use of Calculators Is Not Permitted On This Exam

1. Let

$$I = \int_0^{\sqrt{\pi}} \int_y^{\sqrt{\pi}} \sin x^2 \, dx \, dy$$

Sketch the region of integration, reverse the order of integration and evaluate I.

2. Find the surface area S of the portion of the surface $z = x^2 - y^2$ which lies inside the cylinder $x^2 + y^2 = 9$.

3. Compute by triple integration the volume V of the region D that is bounded by the parabolic cylinder $x = y^2$ and the planes $z = 0$, $y = 0$ and $x + z = 1$.

4. A star occupies the spherical region D with radius a centered at the origin. Its density is given by

$$\delta(x, y, z) = ce^{-\left[(x^2+y^2+z^2)/a^2\right]^{3/2}}$$

where c is a constant. Determine the mass of the star.

5. Compute $\int\int_D y dA$ where D is the region bounded by $y = 2x,\ x = 2y$ and $x + y = 3$ by making the change of variables $x = 2u + v,\ y = u + 2v$.