MATH 241H Dr. Wolfe SAMPLE THIRD HOUR EXAM FALL 2011

The Use of Calculators Is Not Permitted On This Exam

1. Let

$$I = \int_0^2 \int_{x/2}^1 xe^{y^3}\, dy\, dx$$

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 $z = xy$ 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. Find the mass of the solid lying between the spheres $x^2+y^2+z^2 = 1$ and $x^2+y^2+z^2 = 4$ if the density at each point is proportional to the reciprocal of the distance from the center of the spheres. (Call the constant of proportionality k.)

5. Compute $\int\int_R x\, dA$ where R is the region bounded by $xy = 1$, $xy = 2$, $x(1-y) = 1$ and $x(1-y) = 3$ by making the change of variables $x = u + v,\ y = v/(u + v)$.