Third Examination
Monday, March 30, 2015

Instructions: This exam should be done on your own paper. Your name should be on each sheet and on the back of the last sheet; the answers should appear written carefully and in order. If in doubt, show intermediate steps: Full credit may not be given, even for correct answers, unless work is arranged clearly and explained. This exam is closed book. You may leave after handing in your exam paper, but be sure to check your answers carefully. You may keep this exam sheet. Each problem is worth 25 points.

In each of the following, find exact expressions. (Do not give numerical approximations.)

1. Find

$$\int\int_{\mathcal{A}} y\,dA,$$

where $\mathcal{A}$ is the triangle with vertices $(0,0)$, $(1,1)$, and $(2,0)$.

2. Find the double integral of $f(x,y) = \sin(x^2 + y^2)$ over the disk of radius $\sqrt{\pi}$ centered at $(0,0)$.

3. Find

$$\int\int\int_{\mathcal{V}} e^{x^2+y^2+z}\,dV,$$

where $\mathcal{V}$ is the cylinder of radius 1 with axis the z-axis and extending from $z = 0$ to $z = 2$.

4. Find

$$\int\int\int_{\mathcal{V}} \frac{1}{x^2 + y^2 + z^2}\,dV,$$

where $\mathcal{V}$ is a ball of radius 4 centered at $(0,0,0)$ with a concentric ball of radius 1 removed from its center.