MATH 241 EXAM # 3 Problem 1 Nov. 5, 2004

Name: TA: Section:

1. [20] Find the area of the region enclosed by the curve $r = \sqrt{\sin\theta}$.

HONOR PLEDGE: I pledge on my honor that I have not given or received any unauthorized assistance on this examination.

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Signature _____

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Name: TA: Section:

2. [20] Let D be the region in the uv plane bounded by $u = v^2$ and $u = v + 2$. Let S be the surface parameterized by $\mathbf{r}(u, v) = (u + v)\mathbf{i} + (u - v)\mathbf{j} + 2v\mathbf{k}$ for (u, v) in D. Find the surface area of S.

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3. [40] Let D be the region in the first octant inside the sphere $x^2 + y^2 + z^2 = 16$ and outside the cylinder $x^2 + y^2 = 4$. Suppose D has mass density $\delta(x, y, z) = (x + 2y)z$. Write down, but do not evaluate, integrals giving the total mass of D

a) in rectangular coordinates.

b) in cylindrical coordinates.

c) in spherical coordinates.

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4. [20] Let R be the region bounded by the lines $2x - y = 1$, $2x - y = 2$, $x = 2y$, and $\frac{x-2y}{2x-y} = \pi/2$. Find

$$\int\int_R (2x - y) \sin\left(\frac{x - 2y}{2x - y}\right) \, dA$$