MA 227-5D Spring 2003 Test 2
Name _____

1.Find the point(s) on the surface $z^2 = 2xy + 3$ closest to the point $(0, 0, 1)$.

2. Let

$$I = \int_0^1 \int_{-\sqrt{x}}^{\sqrt{x}} xydydx + \int_1^4 \int_{-\sqrt{x}}^{2-x} xydydx.$$

(a) Write I in terms of one or more iterated integrals with the order of integration reversed.

(b) Determine the numerical value of I.

3. A lamina occupies the region inside the circle $x^2 + y^2 = 2y$ and outside the circle $x^2 + y^2 = 1$. The density at (x, y) is given by

$$\rho(x, y) = \frac{1}{\sqrt{x^2 + y^2}}.$$

(a) Find the mass of the lamina.

(b) Find the polar moment of inertia of the lamina.

4. Find the surface area of the surface with position vector

$$\mathbf{r}(u, v) = (b + a\cos(\varphi))\cos(\theta)\mathbf{i} + (b + a\cos(\varphi))\sin(\theta)\mathbf{j} + a\sin(\varphi)\mathbf{k},$$

in which a and b are positive constants with $a < b$ and $-\pi \leq \varphi \leq \pi$, $0 \leq \theta \leq 2\pi$.