Math 2313, Test III

Name _____

1. Evaluate $\int_0^1 \int_0^x \sqrt{1-x^2} dy\ dx$

   answer: $\frac{1}{3}$

2. A solid cube, with edges of length 3, has a density that is equal to the square of the distance from one corner of the box, that is, $\rho(x, y, z) = x^2+y^2+z^2$. What is the mass of the cube? What is its average density?

   answer: $M = 243, \rho_{ave} = 9$

3. Evaluate $\int_0^1 \int_y^1 e^{x^2} dxdy$ (Hint: reverse the order of integration)

   answer: $(e-1)/2$

4. a. Find the volume of the region below the surface $z = 8 - \frac{x^2}{2} - \frac{y^2}{2}$ and above the xy plane. (Hint: convert to polar coordinates)

answer: 64π

b. Find the surface area of this same surface, above the xy plane. (Hint: again, convert to polar coordinates)

answer: $2\pi(17\sqrt{17} - 1)/3$

5. For the joint probability distribution function $p(x, y) = \frac{1}{\pi}e^{-x^2-y^2}$ write an integral (don't evaluate it) which expresses the probability that $x > 3$.

answer: $\int_3^\infty \int_{-\infty}^{\infty} \frac{1}{\pi}e^{-x^2-y^2} dydx$