Math 2313, Test III

Name _____

1. Evaluate $\int_1^2 \int_0^x \int_0^{xy} xyz \; dz \; dy \; dx$

   answer: 255/64

2. Reverse the order of integration: $\int_0^2 \int_{x^3}^{4x} f(x,y) \; dy \; dx$

   answer: $\int_0^8 \int_{y/4}^{y^{\frac{1}{3}}} f(x,y) \; dx \; dy$

3. Find the volume above the $z = 0$ plane and below the surface $z = e^{x^2+y^2}$, over the region $1 \leq x^2 + y^2 \leq 4$. (Hint: convert integral to polar coordinates)

answer: $\pi(e^4 - e^1)$

4. Find the surface area of the surface $f(x, y) = xy$, above the disk $x^2 + y^2 \leq 9$. (Hint: convert integral to polar coordinates)

answer: $\frac{2\pi}{3}(10\sqrt{10} - 1)$

5. a. Find the mass of the cube $0 \leq x \leq 1, 0 \leq y \leq 1, 0 \leq z \leq 1$, if the density is $\rho(x, y, z) = 1 + y^4$.

answer: $6/5$

b. Find the center of mass of this cube. (Hint: two of the three coordinates can be found by symmetry, without doing any integrals.)

answer: $(0.5, 5/9, 0.5)$