Mathematics 550 Test #3 Name: _____

1. (10 points) Let $R = [0,1] \times [0,1]$. Then compute $\iint_R (xy^2 + x^2 + y^3)\, dx\, dy$.

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2. (10 points) Compute $\int_0^1 \int_{x^3}^{x^2} y\, dy\, dx$.

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3. (20 points) For the integral $\int_0^2 \int_{x^2}^{2x} f(x,y)\,dy\,dx$

(a) Draw the region of integration.

(b) Reverse the order of integration in the integral.

4. (10 points) Let $B = [0,1] \times [0,1] \times [0,1]$. Then compute $\iiint_B (1 + xyz^3)\,dx\,dy\,dz$

5. (15 points) Set up (***but do not evaluate***) for the volume bounded by $z = x^2 + y^2$ and $z = 8 - x^2 - y^2$.

6. (15 points) Let R be the region inside the sphere $x^2 + y^2 + z^2 = 9$ and above the x-y plane. Then change the integral

$$\iiint_R \frac{dx\,dy\,dz}{\sqrt{1 + x^2 + y^2 + z^2}}$$

to spherical coordinate. ***Do not evaluate.***

7. (20 points) Let R be the region bounded by $z = 4 - x^2 - y^2$ and $z = 0$. Then set up (***but do not evaluate***) the integrals for the center of mass of R in cylindrical coordinates.