Math 2550, Exam 3 Time: 40 minutes Name and section: _____

1. (25 points) (15.2.48) Evaluate the integral:

$$\int_0^2 \int_x^2 2y^2 \sin(xy)\, dydx.$$

Hint: Change the order of integration.

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2. (25 points) (15.4.18) Evaluate the integral:

$$\int_{-1}^{1} \int_{-\sqrt{1-x^2}}^{\sqrt{1-x^2}} \frac{2}{(1+x^2+y^2)^2}\, dydx.$$

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3. (25 points) Find the center of mass of the object modeled by the volume

$$\mathcal{V} = \left\{(x, y, z) \in \mathbb{R}^3 : a \leq \sqrt{x^2 + y^2 + z^2} \leq b,\ z \geq 0\right\}$$

and having density $\delta = x^2 + y^2 + z^2$ where $0 < a < b$.

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4. (25 points) (15.8.15) Use the transformation

$$\begin{cases} x = u/v, \\ y = uv \end{cases}$$

to evaluate the integral

$$\int_1^2 \int_{1/y}^{y} \sqrt{\frac{y}{x}} e^{\sqrt{xy}}\, dxdy.$$