EXAM III MATH 232, CALCULUS III, FALL 2016 NAME:

Show all work to receive full credit.

1. Evaluate $\int_0^4 \int_{\sqrt{x}}^2 \cos(y^3)\, dy\, dx$. Hint: Reverse the order of integration.

2. Set up $\int\int_D \frac{x^2}{x^2+y^2}\, dA$, where D is the region bounded by $x = 0$ and $x = \sqrt{1-y^2}$, by changing to polar coordinates.

3. Evaluate $\int_{-2}^{4}\int_{0}^{8}\int_{1}^{e^x} \frac{y}{z}\, dz\, dy\, dx$. Make sure you simplify as you integrate!

4. Set up but do not evaluate the volume of the solid tetrahedron which is bounded by the first octant and the plane $x + y + z = 1$ using a triple integral.

5. Find the volume of the solid which is bounded by the cylinder $x^2 + y^2 = 4$ and the planes $z = 0$ and $z = 3 - y$.

6. Evaluate $\int\int\int_E z\sqrt{x^2 + y^2 + z^2}\, dV$ using spherical coordinates where E is the region below the sphere $x^2 + y^2 + z^2 = 1$ and above the cone $\phi = \pi/6$.

7. Set up the integral by making an appropriate change of variables for the integral $\int\int_R \frac{x-y}{x+y}\,dA$ where R is the square enclosed by the lines $y = x$, $y = 2+x$, $y = 4-x$, and $y = 2-x$. Use the transformation $u = x - y$ and $v = x + y$.