MAT 2443: Exam 3 **Name:** _____
April 30, 2014.

No calculators, notes, or books are allowed, except for one 3 x 5 index card. You may have only writing implements (including a ruler or other drawing aids) and blank paper.

Each numbered question is worth 20 points; any lettered parts of a question have the same value.

1. Compute each integral.

   (a) $\int_0^2 \int_0^2 \int_0^2 xyz dx dy dz$

   (b) $\int_0^1 \int_y^1 e^{x^2} dx dy$ [Hint: switch the order of integration!]

2. (a) $\iiint_R z^2 dV$, where $R = \{(x, y, z) : x^2 + y^2 + z^2 \leq 1\}$. [Hint: It should be obvious what coordinates to use!]

(b) $\int_0^2 \int_{-1}^1 \int_{-\sqrt{1-x^2}}^{\sqrt{1-x^2}} e^{x^2+y^2} dydxdz$. [Hint: change coordinates!]

3. Compute the volume of the solid region that lies inside the sphere of radius 1 and above the half-cone $z = \sqrt{x^2 + y^2}$.

4. Compute the volume that lies above the half-cone $z = \sqrt{x^2 + y^2}$ and below the plane $z = 1$.

5. Compute the surface area of the portion of the plane $z = x + y$ lying above the rectangle $\{(x, y) : 0 \leq x \leq 1, 0 \leq y \leq 1\}$.