MTH 234 Quiz 4 Name ____________________________

June 16, 2016 (20 points total)

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1. (4 points) Compute the line integral $\int_\gamma x\ ds$ where γ is the triangle with positive orientation connecting the points $(0,0),(1,1)$ and $(1,3)$.

2. (4 points) Compute the line integral of the vector field $\langle 4zx^3 + y, x^4 + y, x + z\rangle$ along the line segment L from $(0,0,1)$ to $(1,2,2)$.

3. (4 points) Compute the mass of the solid tetrahedron T with vertices $(0,0,0),(2,0,0),(0,1,0)$, and $(0,0,1)$ and with density function $\rho = 2y$.

Hint: It's easier to determine the limits of integration if you draw a picture first.

4.(4 points) The formula for the volume of a right circular cone with radius b and height a is $\frac{1}{3}\pi b^2 a$. Show that this is true by computing a triple integral

$$\iiint_C dV$$

where C is the solid cone lying below the surface $z = a - \frac{a}{b}\sqrt{x^2 + y^2}$ and above the plane $z = 0$. (Hint: Which type of coordinates do you think you should use in this setting?)

5. (4 points) Express the volume of the ball $\rho \leq 8$ which lies between the cones $z = r$ and $z = \frac{1}{\sqrt{3}} r$ as a triple integral in spherical coordinates, and evaluate the integral.