MATH 2415 Calculus III SI Session 11/09/2011

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Wednesdays Rm 1245 03:00 PM - 05:00 PM and 05:00 PM - 07:00 PM

1. Sketch the solid whose volume is given by the iterated integral and rewrite the integral using the indicated order of integration.
   (a) $\int_0^3 \int_0^{\sqrt{9-x^2}} \int_0^{6-x-y} dzdydx$; rewrite using the order $dzdxdy$.
   (b) $\int_0^2 \int_{2x}^4 \int_0^{\sqrt{y^2-4x^2}} dzdydx$; rewrite using the order $dxdydz$.

2. Express as an triple iterated integral the volume of the solid in the first octant bounded by the coordinate axes and the graphs of $z + x^2 = 4$ and $y + z = 4$.

3. A thin plate has the shape of the region in the $xy-$plane bounded by the graphs of $y = 2$, $y = -x + 2$, $y = \frac{1}{2}x - 1$. If the density at (x, y) is given by $\delta(x, y) = x^2 + y^2 + 1$, set up an iterated integral which gives the mass of the plate

4. Find an equation in cylindrical coordinates for the equation given in rectangular coordinates.
   (a) $x = 4$ (b) $z = x^2 + y^2 - 2$ (c) $x^2 + y^2 = 8x$ (d) $x^2 + y^2 + z^2 - 3z = 0$

5. Find an equation in rectangular coordinates for the equation given in cylindrical coordinates, and describe its graph.
   (a) $z = 2$ (b) $r = \frac{1}{2}z$ (c) $r = 2\cos(\theta)$ (d) $z = r^2\cos^2(\theta)$

6. Let V be the volume of the solid inside the sphere $x^2 + y^2 + z^2 = 4$ and below the plane $z = -1$. Express V as an integral in cylindrical coordinates.

7. Let Q be the solid inside the sphere $x^2 + y^2 + z^2 = 4$ and outside the cylinder $x^2 + y^2 = 1$. Express the volume of Q as an iterated integral in in cylindrical coordinates.

8. Evaluate $\int_{-2}^1 \int_0^{2x} \int_z^{x+2z} xdydzdx$

9. A thin plate occupies the region inside the circle $x^2 + y^2 = 4$ and to the right of the line $x = 1$. If the density at (x, y) is given by $\delta(x, y) = \frac{36}{\sqrt{x^2+y^2}}$, set up the integral representing the mass of the plate.