

Name: _____
MATH 205-03: Sections 16.5-7
April 23, 2008

❖ Section 16.5: Applications of Double Integrals

Density function = $\rho(x,y)$

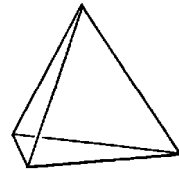
Computation	Symbol	Formula
Mass		
Moment about the x -axis		
Moment about the y -axis		
Center of mass		
Moment of inertia about the x -axis		
Moment of inertia about the y -axis		
Moment of inertia about the origin		

❖ Section 16.6: Triple Integrals

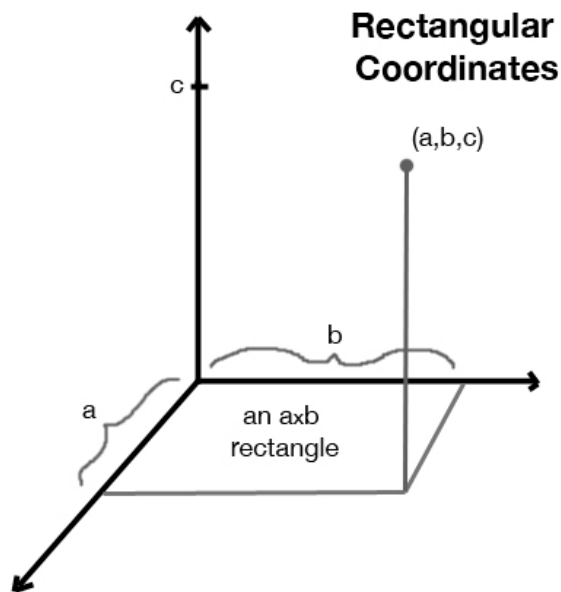
Example 1. Compute the following triple integral, where E is bounded by the parabolic cylinders $y = x^2$ and $x = y^2$ and the planes $z = 0$ and $z = x + y$:

$$\iiint_E xy \, dV$$

Example 2. Use a triple integral to find the volume of the solid tetrahedron with vertices $(0,0,0)$, $(1,0,0)$, $(1,1,0)$, and $(1,0,1)$.

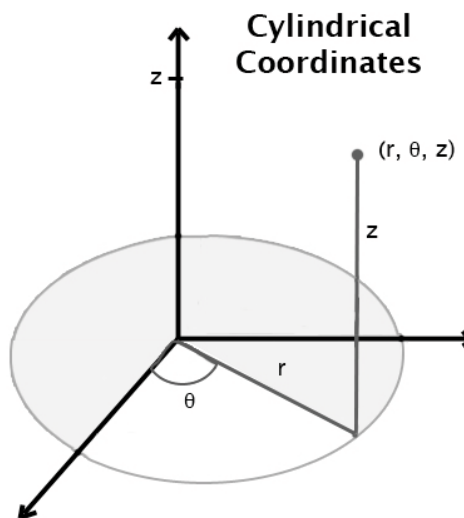


❖ Section 16.7: Triple Integrals in Cylindrical Coordinates



We describe a point (a,b,c) by two things:

- The **rectangle** it makes in the xy -plane
- The value of z , which is how much we shift this rectangle up or down the z -axis



We describe a point by three things:

- The **circle of radius r** it makes in the xy -plane
- Where on the circle it lies (determined by θ)
- The value of z , which is how much we shift this circle up or down the z -axis

Conversion:

Cylindrical	→	Rectangular	Example
	→	x	$(1, 3\pi/2, 2) =$
	→	y	
	→	z	

Rectangular	→	Cylindrical	Example
	→	r	$(2\sqrt{3}, 2, -1) =$
	→	θ	
	→	z	

When should you use cylindrical coordinates?

Example 1. Use a triple integral to find the volume of the region bounded by the surfaces $z = 0$, $z = \sqrt{x^2 + y^2}$, and $x^2 + y^2 = 16$.