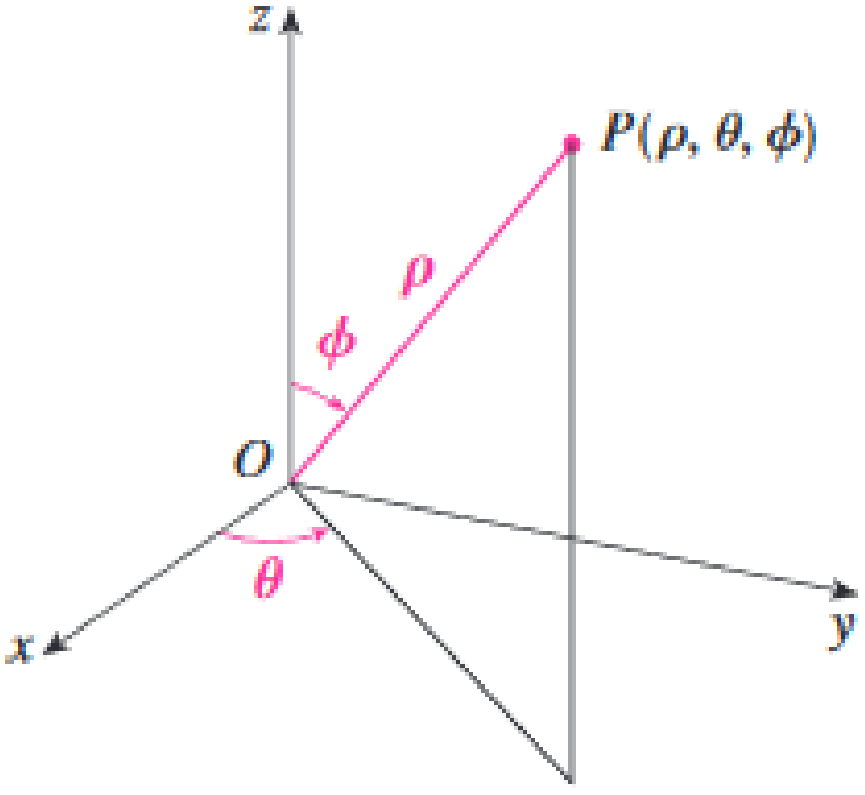
Spherical Coordinates

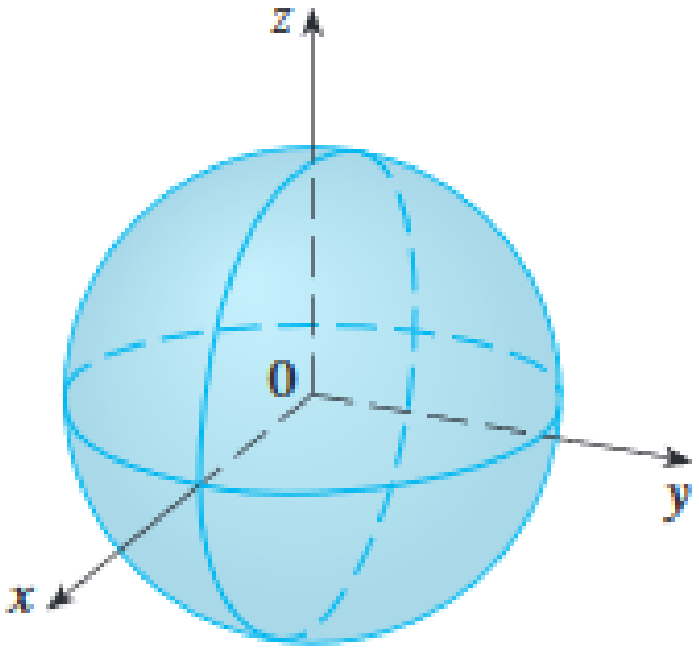
Melanie Dennis

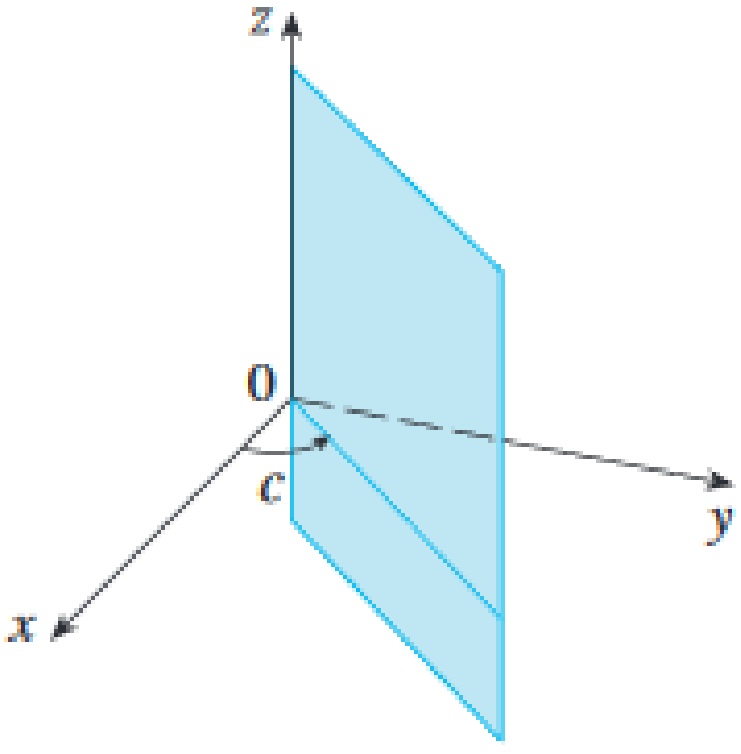
Dartmouth College
Math13

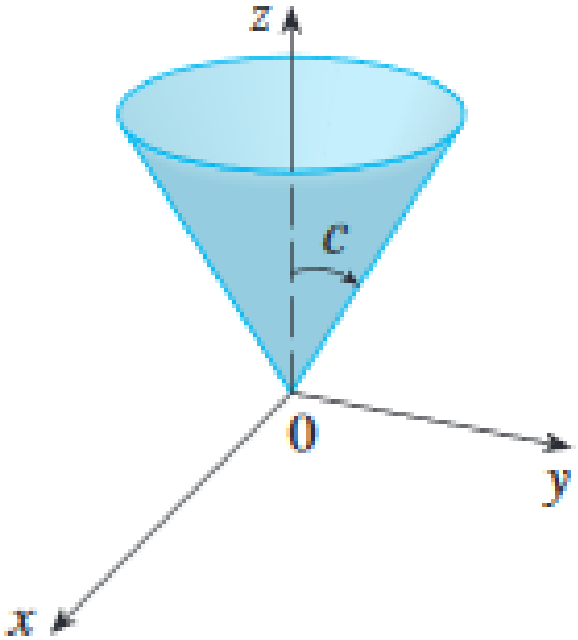
April 9, 2018

Dartmouth

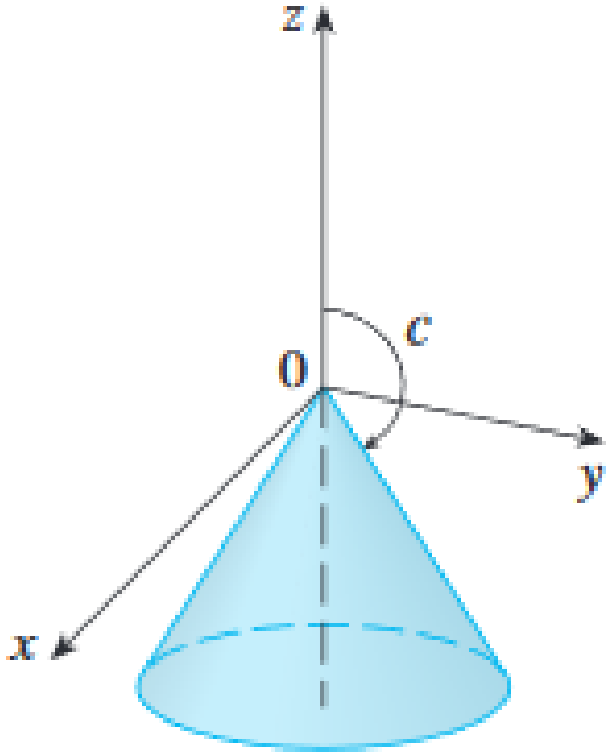

z
P(ρ, θ, φ)
ρ
φ
O
θ
x
y


z
0
y
x

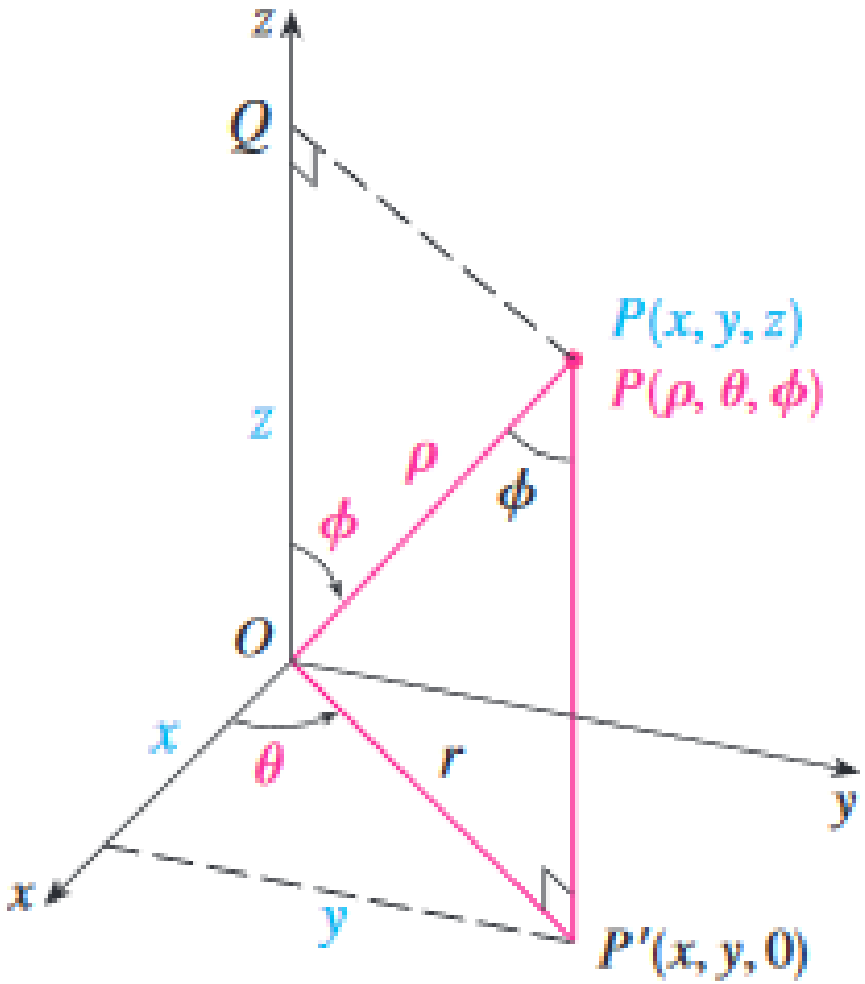




$0 < c < \pi/2$



$\pi/2 < c < \pi$


z
Q
P(x, y, z)
P(ρ, θ, φ)
z
ρ
φ
φ
O
x
θ
r
y
x
y
P′(x, y, 0)

Spherical Coordinates Practice Problems

1. Find the volume of the part of the ball $\rho \leq a$ that lies between the cones $\phi = \frac{\pi}{6}$ and $\phi = \frac{\pi}{3}$.

2. Evaluate $\iiint_{\mathcal{W}} dV$ where $\mathcal{W}$ is the region bounded by $x^2 + y^2 + z^2 = 4z$ and $z = \sqrt{x^2 + y^2}$.

Challenge Problems

1. Find the volume of an inverted cone centered at the origin with height H and largest radius R.