Re: Integrals In Spherical Coordinates

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From: meyousikmann (*meyousikmann_at_nospamyahoo.com*)
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"Daniel Grubb" <grubb@lola.math.niu.edu> wrote in message
news:cnt3u3hgk1@news.math.niu.edu...
>
>>This is homework so I don't want the answer....just some hints.
>
>
>>Let W be the solid bounded above by x^2+y^2+z^2=9 and below by phi=pi/3.
>>Calculate the mass of W if the density at each point is directly
>>proportional to the distance above the xy plane.
>
>
>>As I have it drawn, it is an upward cone about the origin with a slanted
>>plane of z = −x − y +3 for a top. I am having a little difficulty setting
>>up the triple integral as well as the density function. Here is what I
>>have
>>so far:
>
> First of all, you should go back and do some algebra. I suspect that
> you solved for z by going from z^2=9−x^2−y^2 and taking square roots
> to get z=3−x−y. If that is the case, I would almost immediately give
> you 0 points for this problem. Nobody in third semester claculus
*> should do this mistake *ever*.*
>

Well, let me first say thanks for the pointers....they are truly
appreciated. Second, may I also say that I am glad I do not have you for an
instructor. I realized my mistake after walking away from the problem and
coming back with a "fresh" perspective. Don't you think zero points is a
little harsh? That is typically why students fear math and science
courses....no room for error. We learn from mistakes. You scare us away
with zero points. How about a bit of encouragement to keep plugging instead
of a blanket statement that makes the student want to quit. It is called
learning.

>>2 pi pi/6 ???
>> ///
>> ||| ??? p^2 sin phi d−rho d−phi d−theta

>>/ / /
>>0 0 0
>
>>Anyone got any pointers on this one?
>
> Well, your order is messed up. To do any multiple integral,
> figure out the inside limits *first*. The reasoning goes as follows:
>
> If phi and theta are fixed, what are the allowed values of rho
> for the solid? You can think of the rho values as sweeping out
> a little radial line. These rho values can depend on both phi and theta.
> The smallest value is the lower limit on the inside integral, and the
> largest the upper limit.
>
> Now, let phi vary but keep theta fixed. As phi varies, the little radial
> line sweeps out a planar cross−section of your volume. What
> range of phi values are allowed in your figure? These values may depend
> on theta *but not rho* and give the limits of the middle integral.
>
> Finally, what range of theta values are needed for the planar cross
> sections to sweep out the whole volume? These values won't depend on
> either rho or phi and give the limits for the outside integral.
>
> −−Dan Grubb