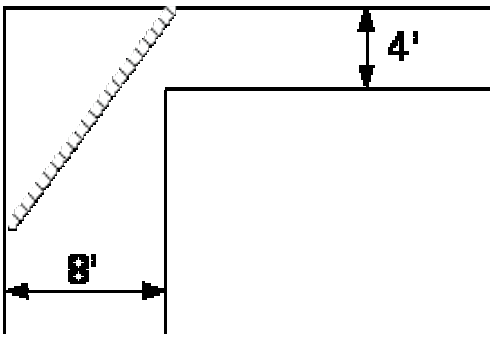
1. **DoNow:**

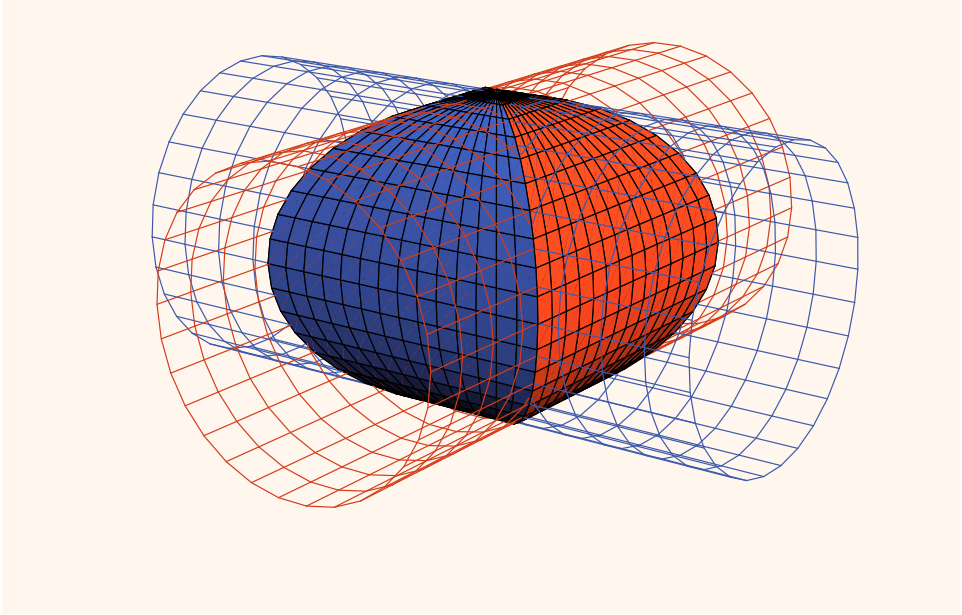
   (a) Evaluate $\int \frac{2x}{x^2+1}\,dx$.

   (b) In general, why does u-substitution work?

2. One hallway which is 4 feet wide meets another hallway which is 8 feet wide in a right angle. What is the length of a the longest ladder which can be carried horizontally around the corner?



3. Two cylinders each with a radius of R intersect at right angles as shown in the diagram.

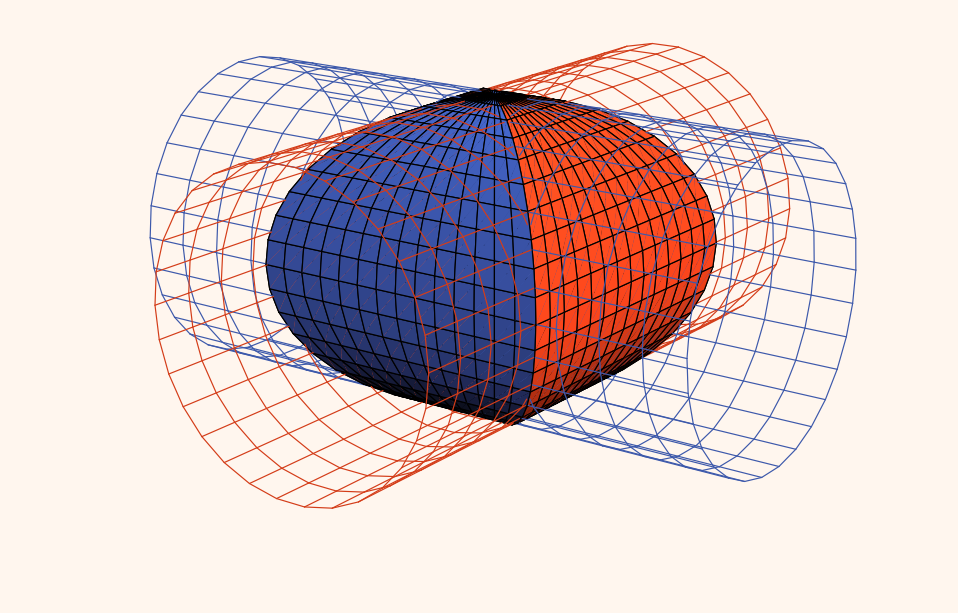


   Find the volume of the intersecting region by slicing the region into volume elements.

   Note: As always, be sure to show how you develop a typical volume element, dV, in terms of *one* variable *before* you setup an integral.

4. Yesterday, you found the volume of a sphere using *shells* for volume elements. Rather slicing a sphere into a stack of ultra thin disks, the shells are ultra cylinders that are nested. (Recall our roll of paper towels.)

   Reconsider the volume of the intersecting cylinders using volume elements that are nested *rectangular shells*, consider *rectangular shells*. Visualize a roll of paper towels where the the cross sections are rectangles.



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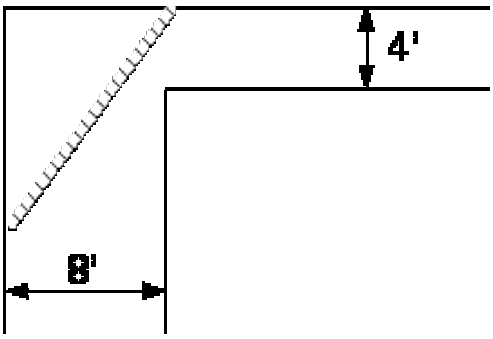

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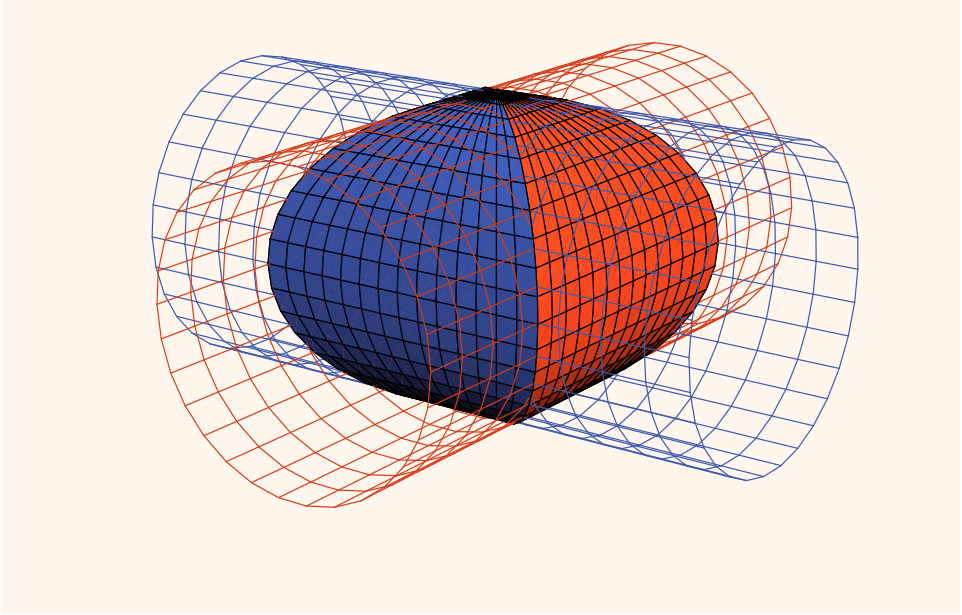

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