

Problem Corner for February 2013

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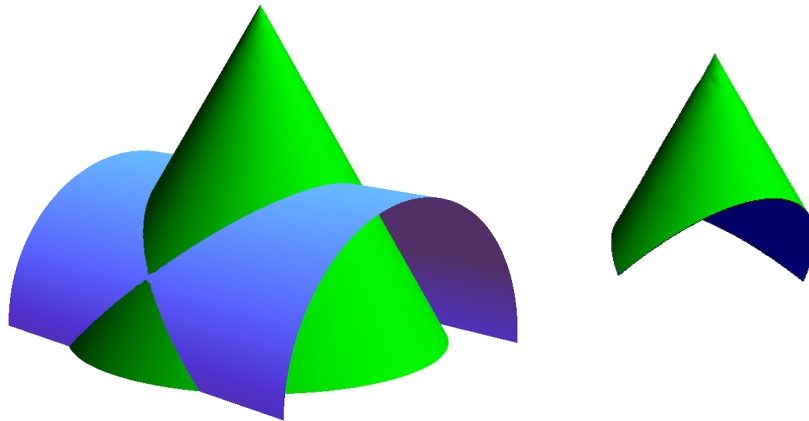
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A solid cone with a base: $x^2 + y^2 \leq \frac{4}{3}$, $z = 0$ and a vertex $A(0, 0, 2)$, a solid cylinder: $y^2 + z^2 = 1$ are placed in R^3 . C is the intersection curve of the cone and the cylinder.

1 What is the surface area of the cylinder circled by the curve C ?

2 What is the volume of the cone above the cylinder?

(i.e. 1 is the blue surface of the lower right object. 2 is the volume of the lower right object.)



3 Suppose a sector D with the right central angle and radius 1 is placed horizontally in a corner made of two walls; one wall faces the south and the other faces the east. And the sunlight comes from the southeast with 45 degrees against the ground. What is the volume of the shadow of D , created by the sunlight? (i.e. how many unit cubes can be hidden under the shadow?)

